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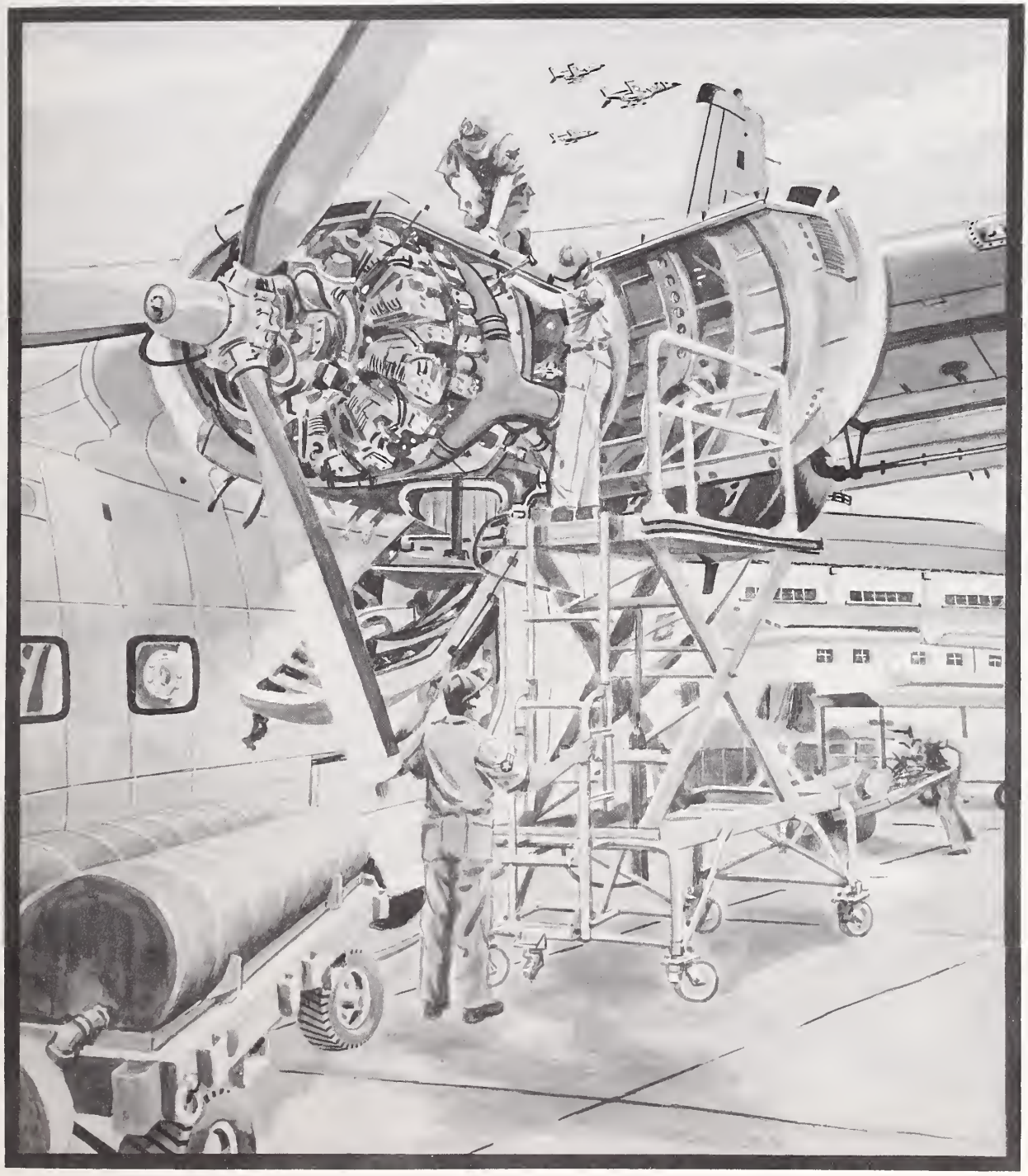
DEFENSE INDUSTRY BULLETIN

Vol. 4 No. 6 June 1968



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FEATURES

DEPARTMENTS

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Editor. Telephone queries: (202) OXford 5-2709.

The *Bulletin* is distributed without charge each month to representatives of industry and agencies of the Department of Defense, Army, Navy and Air Force. Subscription requests should be made in writing on letterhead and addressed to the Business & Labor Division, OASD(PA), Room 1E764, The Pentagon, Washington, D.C. 20301.

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DEFENSE INDUSTRY BULLETIN

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Integrated Logistic Support

The Life-Cycle Task of Support Management

Colonel Gerald Holsclaw, USAF
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Integrated logistic support (ILS) is the life-cycle task of support management. It includes responsibility for preserving continuity in the systematic planning, development, acquisition and operation of weapons and equipment in order to maximize readiness and optimize costs. Given the goal of maximizing weapon and equipment readiness at optimum costs, the integration of logistic support elements into complementary time-phased and mission-oriented actions is a management task which today challenges all members of the defense team—military, civilian and contractor alike.

DOD Directive 4100.35, Development of Integrated Logistic Support for Systems and Equipments, describes integrated logistic support as:

"a composite of the elements necessary to assure the effective and economical support of a system or equipment at all levels of maintenance for its programmed life cycle. . . ."

Management integration of logistic support elements into the systems engineering management process should start at the beginning of concept formulation for a weapon system or piece of equipment. Support management continues through the contract definition, development and production phases of the equipment life cycle. Unlike other elements of systems engineering management which usually terminate with acquisition of the equipment by the using commands, the support management task continues on during operations, with emphasis then on performance instead of planning.

ILS planning can make visible the support requirements essential for improved life-cycle costing and systems analysis trade-offs. It can also provide a sound baseline for achieving lower costs per unit of equipment use under total package procurement concepts. Full development of these latter techniques requires visibility of events and resource requirements. No matter how sound the concept, or how fine the logistic objective, someone has to "work" the technical support management problems of how, what, when, and where, before answering "how much." No computer program or management magic has yet been designed which can do it for us alone.

Today our weapons establish their own complex and demanding support requirements. Too often we are surprised at them—sometimes even indignant at the drains their unplanned demands make on our limited resources of time, men and materiels. Yet why indeed should the shape and magnitude of these requirements surprise us since we control the design of the weapons and the environment in which they are used?

For a number of years now, many serious students of the developing logistics disciplines have been grappling with these problems, and it may be useful to briefly recount them. Prior to World War II, our weapons and equipment were relatively simple. Interest in hardware support invariably followed after interest in design and production. With the advent of war, widening of the electronic spectrum to include radar increased skill requirements and crossed conventional skill boundaries into other increasingly sophisticated mechanical systems. This, of course, pyramided training and technical data requirements.

The natural reaction to these complex subsystems was to increase specialization. By the time of the Korean conflict we were talking "weapon systems" but still using the old methods of procurement first, later followed by consideration of support. Specialists performed alone within their functional support areas, and feedback to design was nonexistent or, at best, haphazard. Support deficiencies defined support requirements. Frequently nothing fit. Handbooks and training characteristically lagged equipment changes. Program approvals and fund approvals were frequently contradictory. Late production and cost overruns reflected reaction to, rather than planning for, logistics requirements. We were truly "pound foolish and penny wise" in forcing support to absorb many program cuts.

Long before the DOD directive on integrated logistic support was published, the need to better identify and control equipment support requirements had attracted the attention of managers, engineers and technicians both in the military and within industry. Until then, the principal efforts to influence support through requirements on design were being developed within the disciplines of maintainability and reliability.

Published on June 19, 1964, DOD Directive 4100.35 first defined the concepts and objectives of integrated logistic support. Today, this directive remains as perhaps the earliest expression of nearly identical goals, newly and effectively expressed in terms of life-cycle costing and single package procurement.

. After publication of the directive, an ad hoc committee, with DOD, Service and industry representation, met under the auspices of the DOD Equipment Maintenance and Readiness Council to produce ". . . a package of selected, integrated management tools to assist logisticians . . . to participate actively and efficiently in the life cycle of system and equipment projects."[1] A series of nine tasks were assigned to nine subcommittees. Much valuable work ensued, exploring the implications and problems of integrated logistic support. Many recommendations and conclusions were reached and reported upon

[1] *"Report of DOD Directive 4100.35/Ad Hoc Committee," Volume I, page 6*

in a series of committee reports. In addition to identifying problems for further study, perhaps the biggest contribution made by these exhaustive study efforts was their value in indoctrinating both study participants and observers in a much wider appreciation of the opportunities for improved equipment readiness and reduced operational support costs available through the integrated management of logistic support elements.

The latest aid to the implementation of DOD Directive 4100.35 is the proposed "DOD Systems and Equipment Integrated Logistic Support Planning Guide." It has been reviewed in draft form by industry and the Military Services and should be published by fall.[2] The guide is the result of effort by a joint DOD working group and the Logistics Management Institute, a non-profit research group under exclusive contract to the Defense Department.

Why do we need a guide? This guide is needed because conflicts within the logistics disciplines themselves often are settled for the lowest apparent cost, without consideration of the future effects on equipment availability or support costs. With notable exceptions in each Service, development plans usually ignore or scatter logistic requirements. We react to, rather than plan for, support requirements. The results are cost overruns and program delays.

It would be wrong to imply that the ILS guide contains much that is new. It does, however, bring together for the first time many valuable techniques and management procedures which have been tried and proven in a variety of circumstances within the Services and industry. The scope, content and format of the guide were shaped by requirements developed one-by-one during joint working group and editorial sessions.

Chapter 1 provides an overview of the purpose, application and contents of the guide. Chapter 2 describes the system design and support management relationships necessary to the proper planning of logistic support. Chapters 3 through 12 describe the life cycle program events for the selected support elements. Fold-ins at the end of each chapter illustrate the required interface between each support element and design management, and support management. These chapters also portray each element's relationship to design, production, test and operations. In its entirety, the guide provides a "kit of tools" for use by program managers, designers and logisticians. It is intended as an aid to assist them in tailoring or critiquing logistics plans and actions in support of equipment readiness.

The guide does this by providing a "road map" of typical logistic actions to be accomplished during the life cycle of a typical equipment program. It is not an inflexible plan. It is intended as a tool for use by project managers in tailoring their own program milestones to fit their own peculiar development requirements, as modified by the degree of system complexity, procurement methods, etc.

The guide addresses functional, rather than organizational requirements. Event sequences are charted to reflect functional relationships rather than existing organizations. The guide's basic procedures are workable today within the framework of existing policies, if project managers and contractors choose to negotiate them into the contracts.

The initial working group task was to revalidate the support elements defined in DOD Directive 4100.35, and describe their interactions by charting sequential support tasks. All elements were revalidated except "Contract Maintenance." While the group recognized the importance of contract maintenance, it was considered a "method" rather than an "element" of logistic support. For example, it is clear that in some cases contracting might be properly employed in support of any or all the logistic elements, and not just maintenance alone.

The engineering disciplines of maintainability and reliability were added as elements from the standpoint of their maintenance preventative roles. These disciplines are also needed to perform trade-offs between support elements, and provide key characteristic inputs from support management to design. It is recognized that they must also remain as functions of design to perform engineering apportionment of performance goals to subsystems and components.

The working group was unanimous in seeing the need to add a "Funding" element to provide fiscal plans in support of technical program approvals. "Technical Logistics Data" was another matter. Much confusion stems from lumping technical hardware descriptions and related instructional or procedural manuals with periodic or transient performance and failure data. Although technical in nature, these latter data measure the results of organizationally combined equipment and people of various skills in various mission environments. While common hardware coding identification should be maintained, the differentiation of these two elements of data as "technical" (for hardware descriptions and procedures) and "management" (for evaluation of equipment and organizational support capabilities) is considered essential.

The last element to be added was "Transportation and Handling." While this could be considered a part of the supply support function, parts and equipment damages, delays and losses are frequently beyond its control. The facts are that everyone who handles hardware has a big responsibility here. It is a responsibility which needs closer consideration by both design and support management at every echelon.

The 10 interrelated elements of logistic support revalidated by the joint working group and identified as requiring project-type management are:

- Maintainability and Reliability (MR).
- Maintenance Planning (MP).
- Support and Test Equipment (SE).
- Supply Support (SS).
- Transportation and Handling (TH).
- Technical Data (TD).
- Facilities (FA).
- Personnel and Training (PT).
- Funding (F).
- Management Data (MD).

[2] *The draft DOD Systems and Equipment Integrated Logistic Support Planning Guide is available from the Defense Documentation Center (DDC), without charge, to authorized organizations with DDC user numbers. Others may obtain it from the Clearinghouse for Federal and Scientific Information, Department of Commerce, Springfield, Va. 22151, at a cost of $3 each (microfiche 65 cents). Document number is AD 663 456.*

The ILS guide places these elements in perspective with both mission objectives and such varied functional management disciplines and techniques as procurement policies, life-cycle costing, configuration management, value engineering, quality assurance, and resource management. It also covers the functional relationships between overall program management responsibilities for system design, support, production, and project administration and control (Figure 1).

The support management function integrates the element activities and meshes support requirements with system design requirements. Support management must be recognized as a function of overall project management.

Planning Integrated Logistic Support

The integration of support management can be visualized in two dimensions of reference:

- Horizontally, support management responsibilities can be thought of as spanning the time from concept formulation through operational employment, paralleling and supporting the design functions during acquisition.
- Vertically, each of the logistic support elements must then also be tied together by support management which has responsibility for coordinating the interface of support with system design at each action sequence on the horizontal time line.

Consideration must be given not only to timing, interface and completeness of all support actions, but also to each support element's relationship to the other project functions and disciplines within the whole spectrum of systems engineering management.

The remainder of this article will provide an overview of ILS management events, as described in the guide, applying to an average program life cycle, and to the interrelationships among the selected ILS elements as their events take place during the same life cycle.

Logistic support planning requires a dynamic working relationship between system design and support management. It involves repeated review and refinement of emerging support requirements and their probable impact on design objectives, including operational and readiness performance characteristics for the use environment. Quantified operational readiness performance specifications (in the form of maintainability and reliability characteristics and projected support requirements) thus become a yardstick against which design and support can be defined in terms of assigned tasks and needs, and evaluated in terms of finite measurements. These specifications, or key characteristics, may be expressed in terms of "numbers," measuring gross system availability, utilization, downtime, turnaround, crew requirements, maintenance man-hours per operating hour, and defined constraints on supporting resource requirements, as appropriate to the equipment type and intended use.

ILS planning includes the elimination of support requirements, whenever practical, and reduction of remaining support costs to the optimum level consistent with operational readiness requirements. Results will not come about by routine observation of support needs. Their attainment requires the systematic evaluation of all design/support characteristics by qualified engineers and support technicians. This involves continuous assessment of the probable impact developing design will have on specific performance and support requirements.

Support management must assure that its task force specialists responsible for the various support elements:

- Understand the mission system and equipment.
- Define actions and resources required for complete life-cycle support.
- Schedule actions and commit resources to support development and future operations.
- Request and utilize funds in a preplanned sequence to preclude cost overruns and unnecessary program delays.
- Use performance and management data and standard staff control techniques to maintain an information and experience exchange between program elements.

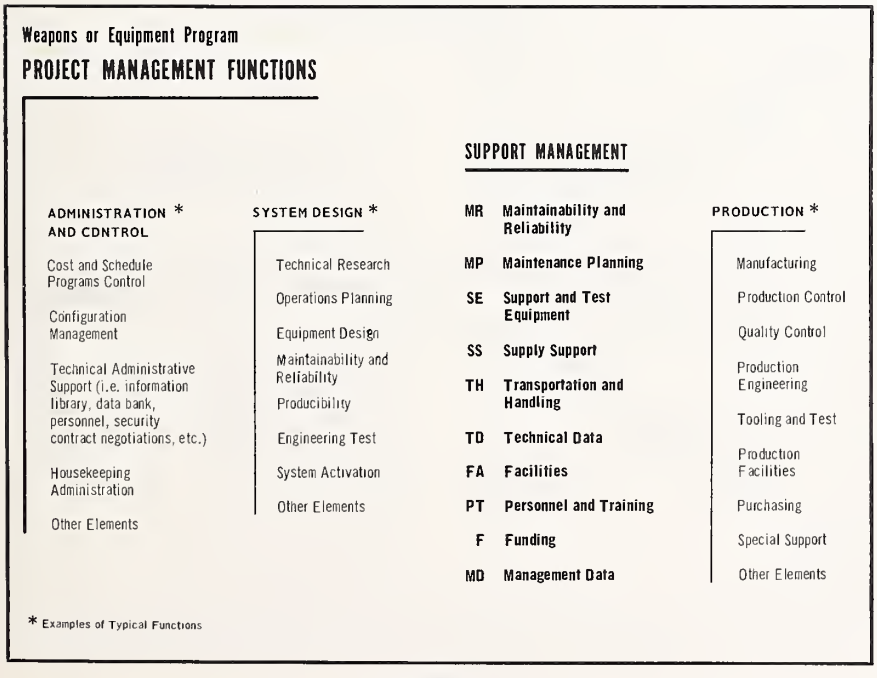

Figure 1.

Concept Formulation Phase

The system or equipment life cycle begins with the identification of an operational deficiency or the need for a new military capability. (See block SD–1 in fold-in chart in center spread in this issue. This chart will be convenient in tracing all subsequently referenced action blocks. This required operational capability (SD–1) is usually defined by the nature of the threat, the anticipated operating environment, variations in basic mission, and the constraints of policy, funding, gross schedule requirements, and mini-

mum system operational performance criteria (*e.g.*, speed, range, capacity, firepower, target acquisition, vulnerability, etc.). These needs may result in tentative requirements for aircraft carriers, logistics ships, aircraft, missiles, radar nets, communications systems, special combat vehicles, or multiple combinations of such systems or equipment.

The logistic support manager and his initial cadre of support representatives must analyze the required operational capability to determine the logistic support capability needed (SM–1). These support capabilities will be stated in terms of:

- Quantitative readiness performance criteria (*e.g.*, system availability, utilization, permissible scheduled and unscheduled maintenance downtimes, operator and maintenance requirements in terms of gross skills and manning levels, firing rates, launch rates, etc.).
- Qualitative readiness requirements (*e.g.*, compatibility with existing replenishment techniques, operational unit self-sufficiency in remote areas, personnel skill level limitations, automated fault isolation techniques, etc.).

The criteria for a missile system may be in terms of a 95-percent uptime availability including scheduled and unscheduled maintenance, 0.7 maintenance man-hours per ground operating hour, remote locations and distances, proximity to support facility, etc. The criteria for a ground transport vehicle may specify 37 total maintenance man-hours per 10,000 miles, anticipated operating hours per month, support self-sufficiency aboard the vehicle (tools, spares, etc.). Where experience does not suggest improvement quantitative goals to shoot for, the criteria will spell out the need for study determination of optimum support performance and cost goals tailored to the type of system needed.

The logistic support manager and his support specialists provide support considerations to the required operational capability document (SD–2) by identifying the needed support capability, proposing modifications to the operational requirements statement which will enhance overall effectiveness, and recommending substitute capabilities or alternate solutions.

The estimate of the current logistic support capabilities (SM–2) consists of an integrated package of each support element's forecast ability to satisfy support readiness requirements defined in the logistic support capability. The information developed by maintainability and reliability, maintenance planning, supply support and the other elements must be analyzed and properly integrated by support management. The results are reflected in the operational capability document (SD–2). For example, the estimates would include readiness performance experience together with lessons learned on previous similar systems. Government in-house and study contract responsibilities should be defined for the development of concepts which satisfy those requirements not covered by current capabilities. All of the information up to this point should be part of the required operational capability document (SD–2). Review and approval of this document provides information to the contractor and in-house for studies necessary to develop system concepts, technical approaches to equipment, and preliminary cost and schedule information. Contracts should clearly delineate responsibilities for development of requirements, schedules, costs, etc., for the subsequent concept study effort.

Based upon the approved operational capability document and implementing studies, several preliminary system and equipment ideas are developed to explore alternate ways of achieving mission objectives. System/cost/effectiveness trade-offs determine the optimum choice among the several system and equipment concepts. Logistic support requirements defined during these feasibility studies (SM–3) permit comparison between various life-cycle support cost alternatives. The concepts might cover alternative ways of recovering boosters from the sea, firing of missiles by sabot versus their own power, alternative access routes to underground equipment, or maintenance and supply at remote sites versus home base. These studies may be summarized for program management review and must record selection rationale behind each considered concept. They include mission analyses trade-offs involving system and support selection, development cost and schedule estimates, life-cycle cost estimates, and preliminary performance specifications.

The system concept formulation package (SM–4A) assures higher authority that the selected system and support concepts are the best way to satisfy the identified operational need, and recommends the

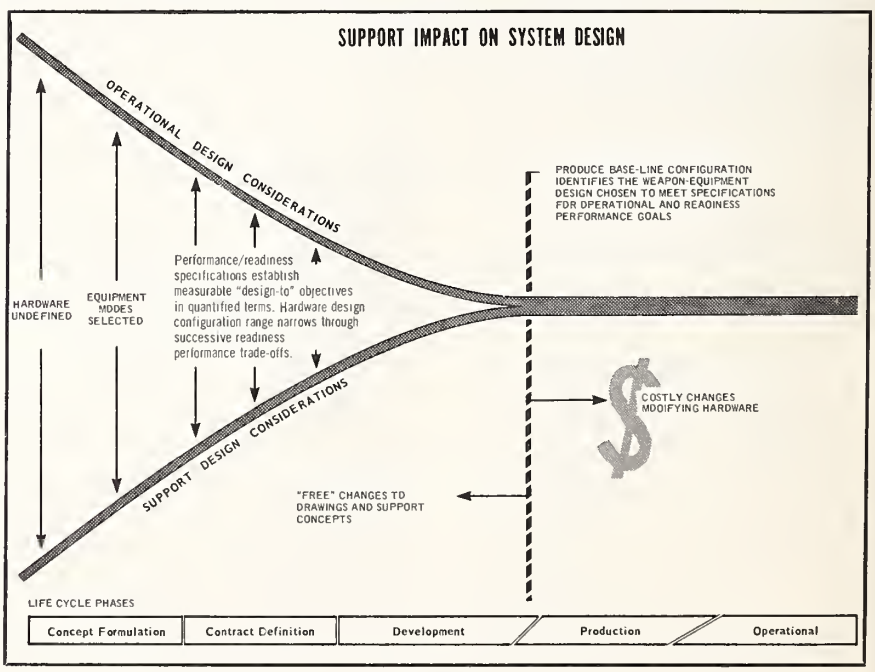

Figure 2.

resources needed to pursue further development. The package contains a description of the proposed system and support concept (SM–4B), the costs and schedules, and the rationale supporting the concepts selection. It provides for a preliminary program review prior to preparing a system development plan. A Program Change Request (SD–4A and SM 4–A) is prepared to incorporate the selected program into the DOD Five-Year Defense Program. DOD approval is granted by a Program Change Decision.

Support plan requirements (SM–5) are developed for inclusion as a logistics section of the system development plan (SD–5). These requirements include gross support functions that meet system or equipment requirements, the design and support goals and criteria in terms of readiness and cost to be met during engineering development, support tradeoff criteria to be considered, and support program management activities and decision points anticipated during subsequent development events. Specific inputs to the support plan requirements include maintainability and reliability goals, maintenance concepts, preliminary support equipment estimates and design criteria, and preliminary supply, facility, personnel and training, funding, technical data, transportation and handling, life-cycle cost and support schedule requirements.

The systems development plan becomes the functional baseline for further engineering development of performance specifications for the concepts selected during the feasibility studies. Acceptance of the development plan is a "key approval action" requiring review and approval prior to contract award and funding release by Service level or Office of the Secretary of Defense authority (as appropriate under existing policy on weapons technology and dollar thresholds). Program reviews leading to this key approval action must insure adequacy of planning for the logistic support of operational maintenance activities. They must be conducted with participation by logistics staff members at the appropriate Service or DOD decision level.

Contract Definition Phase

Before we go on to the contract definition phase, let's go back and review our accomplishments thus far. Although the block sequence traced here is relatively simple, it should be understood that for some complex programs, there may have been several iterations of these previous steps. Decisions should have been reached on questions regarding total or partial package procurements of the system and support resources. What exploratory development has been or is necessary to provide a system which will satisfy the projected readiness requirements? Are the engines and test equipment already in the inventory adequate or must separate interim and long-range programs be planned for their development? How do they tie-in with existing commodity procurements? When can fixed requirements be stated? What are the management relationships that must be considered for the remaining life-cycle phases? What cadre of support personnel should be utilized for subsequent planning? Are maintenance personnel from the operating commands available to help? These questions must be answered before proceeding with the definition phase effort.

Following approval of the development plan, a directive initiating sole source or competitive contract definition for the selected system and support concepts is issued (SD–6A). Included are procurement and budget authorizations. Support requirements (SD–6B), approved as an integral part of system contract definition, are the basis for preparing the logistic support management plan (SM–7A). This plan is to be a management tool for both government and contractor use as appropriate. It defines the specific organizational responsibilities and functions for further development and acquisition of the support resources and monitoring of the contractor efforts. The plan must identify such things as support development program implementation procedures, contractor monitoring policy, maintenance engineering practices to be used, development and acquisition of equipment, procurement and distribution of supplies, funding approach, and other similar management criteria. It includes relationships and responsibilities between development and support commands and firm designation of the logistic support manager.

Effort during the contract definition phase is aimed toward preparation and approval of an "allocation" baseline for the award of development contracts. From this point on, the article will overview most of the events portrayed in the guide, highlighting the design and support management interactions which are critical to logistic support planning. Here again, definition phase effort may be broken down into subphase activities and successive iterations through competitive contractor participation. A source selection authority is established (SD–7A) to provide DOD in-house evaluation of the several competitive proposals. Representative staff elements from the Services provide assistance in these evaluations. The logistic support manager's representatives on the source selection board establish criteria (SM–7B) for evaluation of proposed support plans. These criteria include policies for determining how well each proposal meets readiness performance specifications and cost requirements, take advantage of current resources, minimize technological risks, and consider life-cycle costs for support.

The request for proposal (SD–7C) is prepared for issuance to competing contractors. It contains results of prior studies and the current system specifications. Included are such key characteristics as readiness performance targets, with criteria for their further development, test and demonstrations. Required program management criteria include assignment of responsibilities, and *selective identification of specific portions* of general directives, policies, and procedure guides that are to apply to this procurement. It is of utmost importance that these criteria thoroughly define operational and readiness performance specification goals, and the support management approach to further development and acquisition of support resources. Where appropriate, requirements for life-cycle cost estimates should be defined in final requests for proposals. Program management must consider and define representative cost elements, time elements, and the simplest appropriate methodology to be followed by competing contractors in developing and updating life-cycle cost estimates for program funding and budget con-

trol, and cost of use (and ownership) comparisons. In simple equipment procurements, product use guarantees alone might satisfy these requirements. Similarly, where the contracts include contractor assumption of support responsibilities and associated costs, major life-cycle cost elements may be already included in the cost of acquisition.

Upon receipt of the system and equipment proposals, the source evaluation board reviews and scores each proposal based upon the previously established criteria (SD–8). These evaluations assess the technical soundness of the proposal in meeting performance requirements, degree of identified risk, contractor fulfillment of tasks in the proposal work statements and his ability to accomplish them, best features of each proposal's design approach, costs and schedules, and comparative impact of proprietary rights.

Improved specifications and more definitive terms may be incorporated into the final development contract as a result of negotiations. The updated system development plan (SD–9A) must now include procurement specifications and detailed demonstration methodology; equipment and support element resource requirements, including government-furnished items; cost and price estimates; and any special contract clauses. Review of the updated development plan is prerequisite to key approval action by the designated project approval authority. This review endorses the plan as an allocation baseline for the development contract awards. Approval of the support portion of the updated development plan is a part of the key approval action specified in event SD–9A. Based upon this approval and upon selection of the contractors, development phase contracts are awarded.

Throughout the development phase, system engineering, including maintenance engineering and other logistic support analyses, will be conducted to further define the detailed equipment specifications and support requirements. Detailed design will be completed. Support management should monitor and integrate all activities necessary to develop the resources, evaluate and approve the specifications and designs, and assure that all design/support changes are thoroughly reviewed and evaluated as they occur by all applicable support elements. Preliminary support resources and procedures demonstrations and evaluations should be conducted in consonance with planned system and subsystem demonstrations. These efforts should completely update and validate the support plan as an integral part of the contractor's proposed product baseline, upon which initial production contracts for equipment and support resources can be awarded.

Production of initial units is primarily for limited service and operational tests. First article evaluations and acceptance of the specifications to the as-built hardware then establishes those specifications as a well defined product baseline for key approval of the total configuration and funds release for production runs.

Production and Operational Test Phase

As we enter the full production phase and aim toward the equipping of operating units, user Service tests are conducted at a test facility in a simulated operational environment. Systematic programming and accomplishment of previous system and support events should provide equipment and support resources which will pass these tests with minimum required changes. Systems, equipment and support changes, which do result from these tests, are reviewed by the user and developer and incorporated into follow-on production planning by engineering change proposals. Test results include limited performance experience, technical data validation, support and test equipment performance experience, equipment operator evaluation, and servicing and maintenance experience. Satisfactory completion of the Service tests provides program management with the confidence necessary to continue production and acceptance of hardware in those quantities required for initial deployment to operational units.

Prior to equipping the first operational organization, availability of all system and support resources according to planned schedules is verified. System/support commands, contractors, and using commands review and evaluate shortages, schedule problems, priorities, delivery plans, inventory distribution, and any other applicable material management considerations for possible correction. Coordination between the operational and system/support commands is necessary to insure complete planning for operations and support. Time-phased activity schedules include the exact need dates and phase-over actions required to furnish equipment, spares and repair parts, technical data, personnel, and other system and support resources to the operating units.

Subsequent to user tests and during equipping of the first operational organization, the logistic support plan is updated to reflect operational support changes to responsibilities, policies, controls, coordination, communications, schedules, etc. The updated plan is used for equipping and supporting subsequent operational organizations. The plan is the basis for staff actions in all required support areas at successively higher levels of management within DOD.

Equipping the first organization can vary from the complex installation and checkout of a missile system to the delivery of a test box. Installation and checkout includes receipt and acceptance of equipment and support resources, assembly, installation, test, integrated system checkout, and verification of the system and support resource performance as installed. Compatibility of all interfaces is verified.

The operational suitability test consists of a predefined demonstration of a full complement of equipment conducted by a typical user organization such as a ship, squadron, company, or regiment during routine training operations for a specified time period.

The demonstration objective is to verify achievement of operational requirements (including readiness performance) through mission accomplishment in a defined environment with measured manpower skills and established equipment and facilities support. The value of the demonstration will be in direct ratio to the realism with which test ground rules were negotiated for personnel selection, based on available skills and average manning levels, spare parts provisioning, test mission profile mix, special test data requirements, etc. Management evaluation and control of such an operational test should be directed toward containing the test within these established rules and

objectives. Care should be taken to avoid interference with the detailed operations and maintenance management of the test unit. As part of this demonstration, detailed support evaluations should include verification of personnel skill levels, adequacy of technical data, availability of spares and repair parts, adequacy of facilities, capability of support equipment, adequacy of data collection and distribution plans, and assessment of the overall support system capability to meet its readiness requirements.

Support planning for these demonstrations and evaluations can be very critical where more than one program is involved, or where responsibilities may be split between more than one support command and/or contractor. If, for example, this planning for an air-to-ground missile is such that it does not lay down the specific technical and management requirements in the early development plan way back in SD–5, the specifications and resources for the missile and aircraft surely will not interface and a very substantial change action will occur.

Modification Cycles Will Occur

Earlier in this article, the need for making changes to the equipment and support resources prior to the product baseline was emphasized. We must face the "real world" and recognize that other modification cycles will still occur (SD–22 through 25). They may be initiated by any one of several situations such as:

- Inability of the system or equipment to satisfy its current requirements.
- Changes in mission operational and support roles.
- Correction of discrepancies where the forecast operational and support goals were unrealistic or inaccurate.
- Equipment failures caused by improper design or fabrication.

In all cases deficiencies are identified and evaluated. Trade-off studies are performed to determine the effect of these deficiencies upon future operations and support. Alternate approaches for modifying the system and support resources and procedures are developed. These alternatives incorporate the best of the field experience recommendations as well as innovations created by advances in technology. Emphasis is placed upon the correction of the deficiencies by procedural or simple work-around changes.

Support management must assure that each of the support element specialists evaluate the impact of any proposed changes to the plan. The combined results of these evaluations are weighed. If a change is required, all resulting support requirement changes are included in the proposed modification package. Configuration control board action, approving the modification package, must be in accord with procedures implementing current configuration management directives and instructions. These procedures, directives and instructions also establish levels of approval authority. As at previous key approval points, review and approval action, at the appropriate decision level, must include logistics staff participation to insure adequacy of planning for the logistic support of operational maintenance activities.

Where major system or equipment changes are required, a new production cycle (SD–16 and on) for follow-on operational units is initiated against the new configuration baseline. In such a case, aforementioned modification studies involve planning sequences and actions which are equivalent to the definition and development phase tasks leading to a normal product baseline. The detail for each required action in this testing and analysis sequence may be reduced as appropriate to the modification requirements.

To assure mission success within the time constraints imposed by some operational requirements and to satisfy safety, performance, economic, or other factors, it is often necessary to retrofit existing equipment. In this case change packages are prepared which specify the change requirements, responsibilities, schedules and funding by which the military organizations or selected contractors are to perform the required modifications. These changes are accomplished at field, depot and contractor facilities as designated by the appropriate system/support authority.

Operational Unit Analyses

After satisfactory completion of operational suitability testing, follow-on operating units are equipped. Operational commands direct mission assignments of subordinate organizations and monitor their support performance. Local operating unit analysis of "failure data" (summarizing maintenance actions), along with performance data on mission accomplishment and support responsiveness, will permit unit commanders to separate true hardware deficiencies from those of manning, skills, supply response, organizational management, etc. This evaluated data should be summarized for transmittal to operational commands. Corrective action beyond the capability of unit commanders becomes a requirement for higher command action. Subsequent command analysis involves comparisons between operating units: mission performance, maintenance effectiveness, supply responsiveness, and hardware failure trends. Unit performance for all the above parameters can be weighed against command averages and trends.

Concurrent with operational command management analyses, the system support command will receive raw hardware failure and support data for analysis by the project system support manager (and/or commodity manager). The results of these analyses will be used to update support planning for further procurements, repair and modification. They also provide experience information to project managers engaged in the planning of new systems and equipment.

Reallocation or disposal of operational and support resources is based upon consideration of changes to the required operational capability, technological obsolescence, operations and maintenance costs, and the acquisition of new equipment into the inventory. Integrated logistic support planning for future equipment development should include data from operations and support experience as an aid to management.

Maintenance Planning

Up to this point, the article has covered the integrated logistic support management events from the "gleam in your eye" to the "hereafter". They are the "road map" for better understanding and planning of future support programs.

Next to be considered will be the elements of integrated logistic planning—the vertical plane of reference —which compose the events of the life cycle (see fold-in).

A sample element, Maintenance Planning, is a necessary part of support management in that it has functions to be performed throughout the life cycle, and its products become the requirements baseline for all other elements and the actual execution of maintenance during the operational phase. It has the same life-cycle objectives and goals as any other element of program management. It must interface with other program management functions and use the same policies, disciplines and procedures if it is to be properly controlled and be one of the family. Maintenance planning has definite interface responsibilities with the other support elements. Each support element has this same relationship. Each element is an integral piece of the program gear train. If it is inactive in its role, everything stops for a time—except cost.

As shown in the fold-in, the actions to be performed by all support elements during just the concept formulation and contract definition phase are many. Many people—designers, production men, systems engineers and even logisticians—say, "There isn't very much that logistic support personnel can do in the early phases until we know what the hardware is going to be." "Why talk about support techniques unless you can describe how, when, where and to what degree it is to be used on your program?"

Starting from the top down, both Maintainability and Reliability (MR) are included as maintenance preventive characteristics in equipment design and support resources requirements. Maintainability and reliability goals must be incorporated into the equipment and support system design through specifications. The specification requirements must be stated early in the concept formulation phase. Since their characteristics have a direct influence on operational readiness, they collectively express the optimum end result of equipment readiness performance and cost-effectiveness trade-offs. Some people have said this is a design problem only. What about the time when resources are needed, the concepted point of supply, and the quantities as they apply to trade-offs?

Surveillance over changes in both design and support is required to prevent degradation of maintainability and reliability. Demonstrations with the equipment must be conducted to see that requirements are met. The demonstration results are analyzed and trade-offs conducted to improve system design and support. These early trade-offs result in a continual narrowing down of configuration ideas until a firm production baseline is established. Because paper and prototype changes are relatively inexpensive, maximum emphasis must be placed on maintainability and reliability prior to establishing this baseline.

Maintenance Planning (MP) establishes concepts and requirements for each level of equipment maintenance to be performed during its useful life. As such, maintenance planning defines the corrective actions and supporting requirements necessary to maintain the designed system and equipment in its prescribed state of operations. Maintenance functions include checkout, servicing, crew augmentation, status monitoring, inspection, fault isolation, replacement, modification and overhaul. The degree to which these various functions are to be performed by organizational, intermediate, or depot level maintenance must be spelled out. The maintenance plan responds first to readiness requirements and next to economies in the commitment of supporting resources.

Maintenance planning evaluates current and projected maintenance capabilities, and translates them into requirements which can be responded to by the contractor. Initially, the capabilities are stated as concepts and philosophies which become definitized specifications as system design progresses. Specific maintenance actions, to be performed at various levels of maintenance and the resource requirements needed to support those actions, are identified by systematic and detailed maintenance engineering analysis. This analysis is conducted concurrently with hardware design and repeatedly updated as design changes. Maintenance engineering analysis documentation provides:

- The identification and description of tools and test equipment, facilities, personnel, spares and repair parts, and technical data.
- Quantification of maintenance support needs by time and place.
- Personnel requirements analysis by skill, type and number.
- Facilities loading to establish adequacy and utilization.

The maintenance planning and analysis effort are tailored in depth to the complexity of the hardware and the program detail required.

The purpose of the support and test equipment program is to assure that the required support and test equipment is available to the operating forces and supporting maintenance activities in a timely manner. The ability to perform required unscheduled and scheduled maintenance depends on the adequacy of the support and test equipment, identified or developed concurrently with the prime system equipment. Support and test equipment consists of tools, monitoring and checkout equipment, maintenance stands and handling devices which are categorized into special (peculiar to the system under development) and common (commercially available or currently in the inventory of the requiring agency).

Supply Inventory Management

Maintaining operational readiness under diverse conditions of military use depends directly on the availability of the right supplies at the time and place they are needed. Sup-

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ply Support (SS) is an essential element of the logistic integration effort and is responsible for the timely provisioning, distribution and inventory replenishment of spares, repair parts, and special supplies.

Supply planning for spares and repair parts must be based upon technical inputs from maintenance planners and engineers (*e.g.*, system/equipment utilization rate, operating hours, failure rates, required field repair rates, locations, and selected maintenance items critical to safety and mission accomplishment). Considered are such supply inventory management factors as the agency responsible for support, the planned management method (*e.g.*, item control by project manager, inventory manager, or gross commodity class), item criticality, item priorities, distribution, repair cycles, attrition rate, and replacement lead time. This process requires support management attention through all phases of the equipment life cycle. Inventory management control depends upon current and complete knowledge of item status by configuration and location so that support management decisions can be made on a responsive basis.

The Transportation and Handling (TH) element provides for the characteristics, actions and requirements necessary to insure proper transportability, packaging and preservation of all equipment and support items. The functional requirements and actions are developed from operations and maintenance analyses, equipment design drawings, specifications and other documentation defining transportability criteria, handling equipment and procedures, and packaging and preservation needs. Requirements to be considered include:

- Transportability criteria such as time, locations, duration, frequency, volume, security and stock limits.
- Desired locations for transportation equipment and facilities.
- Planned availability of existing system capabilities by quantity, volume and location.
- Additional or special transportation and handling procurement requirements.
- Interfaces with other system design and support management functions.

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Technical Data Planning

The purpose of the Technical Data (TD) program is to provide for the timely development and distribution of technical data necessary to conduct operations, maintenance, supply, modification, repair and overhaul of the system and equipment. Technical data provides the link between personnel and equipment. It includes drawings, operating and maintenance instructions, provisioning information, specifications, inspection and test procedures, instruction cards and equipment placards, special purpose computer programs, and other forms of audio/visual presentation required to guide people performing operations and support tasks.

Technical data planning must be based upon inputs from equipment operations and maintenance planners (*e.g.*, system/equipment use, design characteristics, operations and maintenance methods and personnel tasks, frequency and time to repair, supply provisioning and inventory items and procedures, etc.). Technical data considerations are involved in design and support trade-offs, tests, demonstrations, production, operations and maintenance. It is just as mission critical to prepare the wrong kind of data as it is to forget a maintenance task or not have a ready spare. If you have 15 minutes to perform a maintenance task and it takes 12 minutes to do the actual maintenance and 7 minutes to get to the manual paragraph, you have aborted the mission. Your instructions should have been on the equipment or in the computer which is guiding you through the test or operation.

Facilities Program Planning

The purpose of the Facilities (FA) program is to assure that required facilities are available to the operating forces and supporting activities when needed. The ability to perform the mission could depend on the adequacy of facilities provided concurrently with the prime system or equipment.

Facilities planning is based on operations and maintenance analyses, equipment design drawings, specifications and other documentation necessary for defining types of facilities, locations, space needs, environment, duration and frequency of use, personnel interfaces, installation activities, test functions and existing facility applications. Development schedules must consider construction delay experience on similar programs due to seasonal weather and other regional considerations, such as labor, soil conditions, etc. Facilities planning requires support management attention through all phases of the life cycle to provide positive coordination with other program elements and with system design.

One of the most important interfaces is that between facilities and funding. Long construction lead time, seasonal delays due to weather, and the necessity to plan early when the specifications for other resources are not yet firm, sometimes makes facilities planning a sporting course. It also makes the justification of funds for support facilities very difficult.

Personnel and Training Requirements

Personnel and Training (PT) must establish the requirements for trained operations and maintenance personnel needed to support the system and equipment through all life-cycle phases. A realistic estimate of current manning capabilities, in terms of both numbers and skills, must be made against the probable quantitative and qualitative manning demands of the system or equipment

support concepts under study. As hardware concepts are developed, design and support decisions must be made with due consideration for their impact on manpower and training requirements. These requirements are translated into specific manning plans in terms of numbers and military skill classifications. Projections of training requirements must reflect attrition experience. Special requirements for trainers and training aids must be developed along with training curricula. These requirements must complement maintenance concepts and technical data methods.

Personnel and training planners must progressively identify manning requirements for test and demonstration, operations and maintenance in the use environment. They must consider task categories and resulting optimum skill mixes needed to achieve or exceed readiness performance goals. Personnel requirements for operations and maintenance must be balanced against manpower availability. All deficits must be covered by firm training actions and timely manpower commitments.

Interface Between Support Needs and Funding

Successful ILS planning during all phases of the equipment life cycle requires management attention to the interface between the support element needs and defense budgeting and financing procedures—Funding (F). Because of their importance to implementing logistic support, funding activities are included as a prime element of support management. These activities should include the:

- Early determination of logistic support funding requirements which, together with experience factors from similar equipment programs, allow accurate forecasting of life-cycle costs.
- Accurate updating of forecasts for timely fiscal planning and apportionment of required research and development, investment and operating funds.
- Allocation of available program funds to each logistic support element based upon its justified need, with emphasis given to program schedule and task priorities.
- Accurate accounting of funds expenditures using work breakdown structure and measurement criteria to insure proper funds utilization and redistribution.

Information Systems Interface

Defense activities use and support many information systems to meet separate technical management needs of organizations with differing development, support and operational missions. These management data systems are defined in equally diverse directives at various echelons in DOD and the separate Services.

Management Data (MD) systems required by support management functions include:

- Maintenance engineering and analysis control documentation.
- Engineering test and demonstration records.
- Program schedule and cost controls (PERT or critical path).
- Maintenance management and failure data.
- Miscellaneous requirements forecasts, *e.g.*, personnel, equipment, supplies, and facilities.
- Configuration management.
- Operational readiness support status.
- Supply management effectiveness reporting systems.

Early in the development phase of the acquisition life cycle, support management selectively identifies the extent to which the aforementioned information systems will be required during the item's life cycle, when they will be required, and how and by whom the requirements will be met.

These requirements are compatible with current directives from the applicable Service. They should be tailored to the level of detail appropriate to the type, complexity, or cost of the item being developed. Simple off-the-shelf procurements might only require already digested and analyzed information. In that case the appropriate "data system" is a simple information gathering and editing activity.

At the other extreme, the acquisition and operation of new and complex equipment may justify electronic data processing support. Here, standardization of data codes, use of available software, and new generation computer capabilities combine to make data-bank concepts attractive. This approach satisfies all the information requirements of the formal systems, and also permits selective reporting of current data to functional support managers on an as-required basis.

Information search, acquisition, collation for library storage, selective retrieval, reporting and dissemination (to user-defined specifications) are all data support functions that may, sometimes, be more economically performed under centralized control.

While the management data events shown in the guide recognize these economies, a word of caution is in order. These data systems are oriented to the use of data to "manage," rather than to the "management of data." It is necessary that the functional support managers recognize both the limitations and capabilities of information collection and data processing. At best, only part of the managers' total information requirements can be coded for electronic processing. Managers initiate data/information requirements by close liaison with system analysts and programmers. They must perform continuing validation and analysis of data products. These responsibilities should not be usurped by or defaulted to data services organizations which are primarily a management support function.

Throughout the sequence of events that constitute integrated logistic support planning, the adequacy of management data for use in conducting operations, maintenance and supply tasks is all important. Also, as summary information, it becomes invaluable to the operational and system support commands as well as to other management levels within DOD. Its proper feedback and categorization for use by each of the support elements is a necessity for estimating the existing logistics support capabilities, all "2 events" on the fold-in.

The kinds of things which must be included in "event 2" estimates are:

- Current target operating hours per period of time, typical probabilities of launch for like systems, system mean-time-between-failure experience, and fall-out rates (MR–2).
- Typical maintenance planning problems on similar equipment (MP–2) as well as policies, concepts and organization structures in existence. In other words, what are the limitations on maintenance, by level and location, that the system design and

support engineers will have to recognize in their upcoming trade studies?

- The adequacy of current support and test equipment (portable versus fixed). Does it appear that the basic performance requirements of the new system may require some exploratory work beyond the present state of the art (SE–2)? Is complete self-sufficiency required, or possible, on a Gamma-Goat type Army vehicle? Recovery of larger booster components from land and sea may or may not be able to use current support equipment. What are the limitations?
- The locations and limitations of current supply points as well as their storage and distribution techniques (SS–2).
- The primary and back-up modes of current transportation and handling systems (TH–2).
- Technical data capabilities being utilized (TD–2). These may be display techniques, previous commercial data applications, current deficiencies on like systems, and on-going development of new processes.
- Current area facilities to be examined (FA–2). Included are definitions of trade-off areas needed to define basing, movement, durations, ground rules for facility construction, and constraints on security, easements and ownership.
- Current and anticipated personnel skills, levels, training and forecast manpower availability (PT–2).
- Concept formulation effort funding estimates for all support elements (F–2). Budget and finance criteria for further development of funding requirements must be established. These criteria should lead to a "building-block" approach to both life-cycle cost estimates and required funding.

This information will provide support management with existing capability data to compare to new program capabilities needed. Decisions can then be made on requirements for new study contracts to develop alternative support concepts.

Event 3 provides for the development of support alternatives. The maintainability and reliability element is designated as the focal point for trade-off studies to assure a complete interface between the system characteristics, design and support concepts and gross requirements. These trade-off studies conducted in-house, by contract, or both, must be part of the system engineering feasibility studies. Selection of concepts (event 4) will be based on these studies and will include projected levels and locations of maintenance, the fault isolation and testing approach, overhaul approach, provisioning approach, materiel management system to be used, gross transport and handling specifications, technical data preparation and distribution methods, etc. These concepts must be adequately detailed for development of support plan requirements (event 5). The support plan requirements are to be included in the Systems Development Plan. They must summarize the support element plan requirements for key approval of the functional baseline and preparation of definition phase contracts. These requirements include such things as:

- Maintainability and reliability goals.
- Criteria for test and demonstration to those goals.
- Maintenance concepts and planning milestones.
- Deployment—where, when and how?
- Maintenance responsibilities by level and location.
- Management and analysis techniques to be employed (type and limitation).
- Government-furnished materiel criteria.
- Equipment development and acquisition criteria.
- Supply support concepts, techniques and program milestones.
- Scope and interfaces of contractor and in-house transportation and handling development effort.
- Technical data development criteria and constraints.
- Facilities specifications by type, location, use and interface.
- Personnel and training criteria for manning policies and priorities, determination of and justification for requirements, personnel utilization, training courses and location, etc.
- Funding schedule criteria for activities in all phases with definitive estimates for definition phase effort and preliminary estimates of life-cycle costs.
- Management data criteria for maintenance engineering analysis control documentation, test and demonstration reports, schedules and cost tracking, item identification and codes, configuration management accounting and control, support status reports, and supply management effectiveness reporting.

This information is typical of the planning checklist information "by kind" which is included throughout the ILS guide. From this point on, the remaining events covered in this article will be simplified.

Evaluation Criteria for Support Plan

During the definition phase of the development life cycle, evaluation criteria upon which contract proposals may be scored must be established for each applicable support element. Evaluations of the proposed plans are performed and a selection made from which a firm support development plan can be established. This plan becomes an allocation baseline upon which development contracts can be awarded to the selected contractor(s). On some programs, requirements for extensive facilities may result in early design and military construction program action (FA–7 through FA–9). Also, transportation and handling requirements may be part of other system support plans. Concurrent with this definition process a financial plan for support should be prepared and updated. Funds should be confirmed and allocated based on the schedule requirements of F–5.

The development phase events consist of a refinement and apportionment of performance goals and funding allocations as maintenance engineering analyses and detailed design progresses. Other support element resource requirements and procedures are defined and prepared (or procured) for early engineering test and demonstration. If equipment design or support "change action" is initiated, coordination with all applicable design or support elements must be repeated to insure interface compatability. This control is essential for such cost-critical activities as provisioning, construction and other long lead-time resource commitments.

Inclusion of optimum solutions into the hardware design and support program results in a proposed product baseline, upon which initial production contracts can be awarded. At this point, the "task force" environment may tend to disappear due to the magnitude of developing functional roles and responsibilities. As a result, lack of interface action by support

management could cause oversights and inadequacies which would now result in production errors and improper commitment of follow-on supporting resources. It is, therefore, important that the support management matrix of planning events, designed for any particular program, must have absolute continuity vertically and horizontally to prevent such costly oversights and inadequacies.

This "road map" is just a starting point. Any specific program network must not only be on paper, but the logic of its approach must be understood and recognized by logistic support personnel through education. As mentioned earlier, each support manager must tailor the road-map events to the needs of his own organization and specific program.

Operational Suitability Demonstration

Service testing of the initial production articles may take place in an actual or simulated operational environment. The support demonstrations must assure that:

- Maintenance functions can be performed at the assigned maintenance levels.
- Maintenance tasks can be accomplished by the skill levels specified in the allotted time.
- Support and test equipment can support the maintenance function as planned.
- Technical data correctly describes maintenance tasks to be performed.
- The supply support planning is correct, including distribution and range of spares, repair parts and special supplies.
- Safety factors have been satisfactorily considered.
- Facilities will satisfy intended functions.
- System design for maintainability has been accomplished as specified in the contract.

All support element plans are updated as a result of the demonstration and verification (SM–21). This logistic support plan will be very important to operational organizations receiving the equipment for Service use. The plan provides operational maintenance staff members and commanders with an understanding of the planning projections and backup already taken, upon which their preparations for organizational support should be predicated. The plan will help guide the development command, the contractor and using commands during delivery, inspection, installation, checkout and initial use of equipment and supporting resources.

Monitoring of support effectiveness during the operational suitability demonstrations is required to determine the degree of achievement of readiness performance specifications within contractually agreed upon test parameters. Specific demonstration requirements should include such things as:

- Measured achievement of specified maintainability and reliability goals.
- Verification of technical data maintenance support procedures.
- Verification of the adequacy of personnel training in specified skills.
- Assessment of the availability of personnel, spares, repair parts, special supplies, facilities, support and test equipment.
- Verification of the range, location and specified use of spares, repair parts, special supplies, support equipment, etc.
- Assurance that maintainability, reliability, safety and human engineering characteristics in both equipment design and support are adequate.

Support deficiencies will be identified and analyzed, using test data collected to satisfy maintenance demonstration requirements (MD–22). The results of these analyses become part of the logistic support evaluations (SM–23).

The plan for the operational suitability demonstration must specify personnel as test conductors who are experienced in operational maintenance of similar equipment and assigned as evaluators (umpires, not technicians). The team will include contractor and Service participants under project manager direction. Proposed modifications to hardware and support resulting from evaluations are analyzed for changes to the support plan. Recommendations are made for hardware design changes where trade-off studies justify them as effective improvements. These actions are conducted in accordance with applicable configuration management directives and instructions. The revised plans are used by follow-on operating units and their appropriate commands.

In summary, the central theme of integrated logistic support is management—management which is oriented to life-cycle mission objectives. It is not a new fad or cult. It is achieved by central management of all support elements, however anyone may choose to define them. Properly and selectively applied by program managers, ILS planning will encourage design innovation, rather than restrict it. It can improve system performance and availability. It can minimize schedule delays and cost overruns by planning support actions rather than reactions.

In aiming at the objective—mission ready units—integrated planning of logistic support must be achieved through sound management at all levels of responsibility. Success depends upon a sound working relationship between support management and system design. It is our opportunity to increase readiness and control mission costs by design rather than chance.

Collapsible Chair Prevents Shock

The combined research efforts of the U.S. Navy and industry has resulted in safety collapsible chairs mounted on small craft, designed to protect men exposed to shock motions from underwater explosions.

Idea for the new safety device was suggested by General Motors' safety collapsible steering column which can collapse as much as eight and one-fourth inches at a controlled rate in the event of impact.

As a result of a working agreement between the Navy and General Motors, the collapsible column principle was applied to shipboard chairs and deck platforms greatly reducing the danger of casualties resulting from shock blasts.

River patrol boats now in use by troops in Vietnam have been equipped with shock protection chairs and deck platforms. Each chair and platform unit uses eight of the energy-absorbing columns.

The advantage of the newly developed collapsible columns, over other devices, is their durability and suitability for shipboard use, in addition to being an inexpensive, mass-produced item readily available for immediate application.

Youth Opportunity

Help Young People To Help Themselves

Hubert H. Humphrey
Vice President of the United States

[*Editor's Note: Vice President Humphrey is Chairman of the President's Council on Youth Opportunity. He has frequently said of this responsibility, "Of all my work in government, none has been more challenging, nor rewarding."*]

We in America have an important job ahead of us this summer. The job is youth opportunity—helping young people, especially the poor, to help themselves through work, play and learning.

Poor youth have special summer needs. Most of them can look forward only to heat, idleness and boredom in the summer months. Most schools are closed. There is a tragic lapse of training, activity and supervision. For far too many, there is no work, no fun, and no place to cool off.

These young men and women desperately need opportunities—the kind of opportunities that stretch across 12 months, not just the 9 months of the regular school year.

They especially need jobs. A vast majority of those old enough to work, want to work. They want to earn and learn, to pay their own way, to achieve a sense of personal worth.

Millions do not get that chance. Last summer there were 1.5 million young people, 16 to 21 years old, who sought work but did not find it. Probably an equal number did not even bother to look because they knew it was hopeless.

They need a variety of things to do. Earning and learning are the top priorities, but within the accomplishment of each lies the intangible—motivation, inspiration, creativity, a sense of self-worth, a healthy body. A place to play and somebody who will listen, a chance to express what is felt and seen, a chance to compete, just plain fun—these, too, are essential.

For the younger ones, this might mean regular chances to swim in a portable pool or romp in a fire hydrant sprinkler, games on a closed street with mobile recreational facilities, a week of camping, visits to the ball park, a chance to play ball, a ride on an airplane or a train.

The older ones require varied programs which can accommodate a multitude of individual interests and needs. They especially need a sense of running their own show.

All age groups need people, too—people who will show them how, tell them why, and give them hope. Few have had the advantages of a normal family life, a safe neighborhood, a good school. A sympathetic supervisor, counselor, or volunteer leader thus becomes the central focus of the program and the key to its success.

Providing opportunities for youth to work is a job tailor-made for defense contractors. It is a unique opportunity to serve humanity. Serving humanity, of course, means helping people to help themselves—working with them, not for them. This is something Americans have always believed in, and worked toward.

Throughout our nation this summer, people from all walks of life are forming a new partnership, a partnership that embodies the hopes of America in 1968.

Government is involved, but so are business, labor, the schools, churches, young people themselves, civic groups, and many more.

Hubert H. Humphrey

The goals are clear: Good jobs, not menial tasks; good schooling, not closed doors; good recreation, not just a basketball hoop.

You, your organization, your church, your neighborhood, your place of business or employment—all can join this partnership.

Too many of us await the leadership of our organization, our city government, or somebody else. But individual initiative is the key in helping people. You can act individually, and I ask you to do so.

Here are some suggestions:

- **Organize your community.** Talk with your mayor. You can ask him what the city government is planning to do for youth this summer, point out overlooked needs and unused resources, and volunteer your help and services.

- **Take an inventory of needs and opportunities.** How many young people in your community will need help finding work this summer? How many will have no access to regular recreation?

You can locate unused resources such as National Guard armories, vacant lots, abandoned buildings. You can arrange to use nearby military facilities when they are not otherwise in use. You can establish machinery to locate half-filled theaters and buses, empty seats at the ball park and concert, vacant camp beds. You can help assure that those facilities are used.

- **Find jobs.** This is perhaps the most important task, and it is a task in which members of industry can provide special help.

You may have direct hiring authority or be in a position to urge adoption of company policies to open more jobs for the young. And when young people come to work in your business or plant, you can give them a helping hand. Remember how fear-

(*Continued on Page 16*)

Bidding on Government Contracts Zero Defects Program Works Here, Too!

Herbert G. Fredericks

While it has generally been conceded that a Zero Defects Program is applicable to production lines and routine paperwork, it is undoubtedly true that much bidding effort is wasted and many contracts lost as a result of poor bidding practices. Generally speaking, those defects are applicable to both the preparation and submission of bids in formal advertising, and quotations and proposals in negotiated procurements. For the purpose of this article, generally no attempt is made to distinguish between bids, proposals and quotations, all of which under the new Standard Form 33 are designated as "offers."

Late Delivery

The late receipt of an offer which is not entitled to consideration is tragic for both the Government and industry. Considering the effort which goes into the preparation of an offer, it seems elementary that industry would take the effort to establish a record of zero defects in this area. The failure of an offer to receive consideration in many cases results in the Government paying a higher price for the item required, than would have been the case had the offeror taken steps to insure timely submission of his offer. In some instances when no other reasonable, responsive offers are received, the effect is the delay and cost of resoliciting.

The problem of the late offer generally arises under two sets of circumstances. The most common is the situation in which an offer is mailed by ordinary mail but, due to a delay in the mails (which is not uncommon), it is not received in time. Another cause of the late offer is the unexpected happening when it is delivered by a representative of the offeror. Every procurement office has been the recipient of the tale of woe of the salesman who, due to the breakdown of his automobile, a minor or major accident, or a roadblock of some kind, arrives a few minutes too late.

One occurrence which illustrates the dangers of hand delivery may emphasize the point. A firm, which had participated in the development of an item and had obtained the first production contract, spent considerable effort vainly trying to convince the government agency that it should be given the second production contract on a sole-source basis. When the solicitation for the second contract was issued, it provided that the time for submission of offers was 2 p.m. on March 15. Thereafter, two amendments to the solicitation were issued setting the time for opening at 2 p.m. on two new dates. However, when the third and last amendment was issued, all of the bid opening rooms of the agency were already scheduled for 2 p.m. openings, so the opening was rescheduled for 10 a.m. on a specified day. To make a long and tragic story short, since the main office of the bidder was in the same area as the government agency, about 1 p.m. on the day of the opening, in strolls the sales manager congratulating himself that he had allowed plenty of time to get to a 2 p.m. opening. As is so often the case, the sales manager did not read all of the fine print on the last amendment with regard to time of opening and assumed erroneously a 2 p.m. opening. Unfortunately, his offer could not be considered since it was a late handcarried offer. If at least one copy of the bid had been mailed the previous afternoon by certified mail, it undoubtedly would have been received by the 10 a.m. opening time, and the sales manager's error as to opening time would have been of no effect.

The solution to the problem of the late offer is so simple that the vast majority of rejected late offers could be avoided with a minimum of effort. Item 8 of the Standard Form 33A (Solicitation Instructions and Conditions), entitled "Late Offers and Modifications or Withdrawals," specifies in detail how proof of mailing by registered or certified mail receipt, postmarked and if possible the exact time of mailing initialed by a postal employee, will be accepted to prove timely mailing and thus require the acceptance of an offer received after time for opening, if due solely to a delay in the mails.

Item 5 of Standard Form 33, entitled "Submission of Offers," points the way to having as much time as possible for the submission of a timely offer and yet insuring a timely submission. Item 5 provides, in part, that offers may be modified by telegraphic notice, provided such notice is received prior to the hour and date specified for receipt. Rather than risk a late submission, it is suggested that a tentative offer (not so designated) be sent by registered or certified mail in sufficient time for arrival at the opening office as required and that, if necessary, a last minute modification be made in the offer by timely telegraphic notice.

There is another unusual procedure which may on occasion be used to minimize the possibility of a late unacceptable offer. Although there is usually a requirement that offers be furnished in duplicate or triplicate, the Armed Services Procurement Regulation (ASPR), paragraph 2–405(i), provides that the failure to furnish the requisite number of copies is a minor informality which will be waived. Accordingly, if there is a question as to whether there is sufficient time for mailing, the offer

should be prepared in duplicate, or as many copies as required, and one can be mailed and another copy hand delivered.

There is one caveat, however, that applies to both mailed and telegraphed offers or modifications. Many government agencies require both types of communications to be delivered to a communications center and the normal time for processing, through such a center to the specific place of opening, must be considered in determining whether an offer was mailed or telegraphed in time to have been timely delivered.

Representation at Public Openings

Is it worthwhile to be present at a formally advertised solicitation opening? Generally there is no necessity for an offeror to be represented at a formal solicitation opening. (Box 2 on Standard Form 33 will indicate that a solicitation is either advertised or negotiated. Only advertised solicitations permit public opening of offers.) Usually the abstract of bids can be obtained from an information service organization or the government agency itself. The advantage of being present at the opening in formal advertising being slight, the question should be resolved on the basis of cost. Considering the place, time of opening, and the value of the potential award, is it economically wise? The main advantage to being present at the opening is the opportunity afforded, under ASPR 2-402.1(c), to examine the bids with a view to protesting the award to an apparent low offeror who may have qualified his offer in some manner, although normally the government agency will reject such an offer on its own initiative. Much valuable information can be obtained from an examination of the abstract of bids at the bid opening or as obtained through an information service. The extent of the competition, who is the competition, and the price range are available. Although the contracting officer is required to question apparent mistakes in offers, a mistake is not always apparent, particularly when there is a limited number of bids. Errors should be more obvious to knowledgeable members of the industry in question, and a bidder may conclude that he has made an error and immediately assert such an error.

In connection with personal attendance at bid openings, there are probably some lessons to be learned from an incident which took place at the Pine Bluff Arsenal some years ago. A few minutes before time for bid opening, Bidder A said to Bidder B, "What is your price?" The latter responded, "$1.05 each." Whereupon, Bidder A pulled a piece of paper from his pocket on which he wrote something, folded it, and handed it to the bid opening officer. The note read, "I modify my bid and change my price to $1.04. Signed Bidder A."

Non-Responsive Offers

As a general principle, an offer in formal advertising will be declared non-responsive and rejected, if the bidder takes exception to any of the essential requirements of the invitation which usually include FOB point, delivery schedule, liability to the Government, or the rights of the Government under any of the clauses of the proposed contract. An infrequent but easily avoided basis for rejection of bids is the inadvertent conditioning of bids. A typical example of this is the use of printed stationery to transmit the bid (no letter is necessary) which contains some language indicating that "all quotes are subject to price in effect at time of delivery" or "not responsible for delay in deliveries caused by (reason)." In some cases such offers have been rejected as having been conditioned by the letter of transmittal.

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Perhaps the best rule regarding the submission of a letter of transmittal with a bid is "don't". Since this article is not intended to be a comprehensive legal treastise, it is not intended to imply that a letter of transmittal should never be used in "advertised" as distinguished from "negotiated" procurements, but to do so is dangerous. If there are any ambiguities in the solicitation or the referenced documents, it is important that they be clarified (if at all) before the bid is submitted. The importance of this procedure is emphasized by a case in which an offeror stated in bold type "This letter does in no way qualify my bid," but then went on to say that he assumed that water emulsion would be used on all phases of the job. The specification required oil emulsion on one phase of the job, and the bid was rejected as non-responsive. Government purchasing agents are reasonable people and welcome the opportunity to clarify, by an amendment (including an extension of time for submission of offers), anything which could lead to misunderstanding. Necessary clarification can be obtained upon request before submitting an offer.

The antithesis of furnishing too much information, which may make an offer non-responsive, is the failure to furnish some essential information which will have a similar effect. The failure to furnish when required by the invitation the items listed below has resulted in rejection of bids:

- A guaranteed weight.
- Place of origin or shipment.
- Descriptive literature.
- Evidence of authority to use government facilities.

One of the most annoying and frustrating reasons for rejecting an offer is the failure of the offeror to acknowledge receipt of an amendment to a solicitation which is material. It matters not whether the amendment was properly mailed or received by the offeror, the failure to acknowledge it in most cases results in the rejection of the offer. Again there

are several ways in which any offeror can protect himself. If the contract is of sufficient importance, the offeror should telephone the government representative designated in Block 9 of Standard Form 33 several days before opening and determine what, if any, amendments have been issued by the Government and, if necessary, make arrangements to obtain and acknowledge all amendments. Similarly, if a representative of the offeror is to hand deliver the offer and to attend the opening, he should make similar inquiry as far in advance of the opening as is practical.

Protection as to Quantity

One of the most important conditions of the Standard Form 33 is number 10, entitled "Award of Contract", and, in particular, paragraph (c) which reads:

"(c) The Government may accept any item or group of items of any offer, unless the offeror qualifies his offer by specific limitations. UNLESS OTHERWISE PROVIDED IN THE SCHEDULE, OFFERS MAY BE SUBMITTED FOR ANY QUANTITIES LESS THAN THOSE SPECIFIED; AND THE GOVERNMENT RESERVES THE RIGHT TO MAKE AN AWARD OF ANY ITEM FOR A QUANTITY LESS THAN THE QUANTITY OFFERED AT THE UNIT PRICES OFFERED UNLESS THE OFFEROR SPECIFIES OTHERWISE IN HIS OFFER." (Capital print in original.)

Since this provison now applies to both advertised and negotiated procurements, it is more important than ever that government contract offerors take advantage of the opportunity provided to condition their offers with respect to items or quantities. If the Government, for example, requests offers on 25 different items consisting of equipment and spare parts, it is conceivable that the total value of item one, the major piece of equipment, would be in the thousands of dollars, and that some of the other line items would be valued in the tens of dollars. Yet, unless the offeror qualifies his offer, he could conceivably be required by an award to furnish a single line item of repair parts. Obviously, if the price of the line items of spare parts was based on receiving the award of the major items of equipment, this could result in a loss contract or, at best, a very annoying one.

Since Condition 10 permits the offeror to qualify his offer, it is appropriate to specify that an award will be accepted as a minimum for a certain group of items, or a certain minimum dollar value. It would be proper in the example cited to state that no contract would be acceptable for any of the items of spare parts (items 2 through 25) unless an award of item 1, the major piece of equipment, is also made to the offeror.

The second sentence of paragraph c of Condition 10, in many situations, poses a greater danger to an offeror who fails to protect himself. For example, if the Government requests offers for 100,000 units and the offeror, based on the quantity, offers a price of $1.00 per unit, usually the Government would accept the offer for the 100,000 units but, under the terms of Condition 10, the Government could award the contract at $1.00 per unit for 50,000 units or 10,000 units, or even 1 unit. In other words, an unqualified bid of 100,000 units at $1.00 each means any quantity from 1 to 100,000 at $1.00 each.

Since the offeror may specify "otherwise in his offer," it is recommended that the minimum quantity which will be acceptable at the price bid be stated, *i.e.*, "Minimum acceptable order 90,000 each." A better bid would be range bidding. For example, "100,000 at $1.00 each and for quantities less than 100,000, an increase of 10 percent in unit price for each decrease in quantity of up to 10,000 units, *i.e.*, 90,000 to 99,999 $1.10 each; 80,000 to 89,999 $1.20 each; etc."

The axiom that something worth doing is worth doing right is most applicable to offers on government contracts.

Youth Opportunity

(*Continued from Page 13*)

ful and inexperienced you were on your first job. That will guide you on how best to help them.

Don't let little things stop you. If a businessman can't productively employ a young person, he can provide financial support to others who can. Oklahoma City has a Job Alert task force which uses donations to pay young people for work in civic projects.

You can get your church to organize the congregation's young people in an "odd jobs shop." Find out which youth want to mow lawns, paint houses, trim shrubs, etc. Then get members of the congregation to call the church when they have work available.

• **Keep the schools open.** Do everything possible to keep school facilities in your community open during the summer. We have more than $80 billion in school facilities and we lock them up for three months every year. That is a tragic waste. You can help to assure that the gyms, the libraries, the shops, the typing and sewing rooms are not locked up for the summer.

• **Provide recreational opportunities.** You can directly aid inner city youth by supporting expanded summer camping, in-town swimming pools, other sport, recreational, and cultural activities.

You can send a poor youth to summer camp for a week, and urge your friends and organization to do the same. A week at camp can cost as little as $25 to $50 per camper.

The American Camping Association has informed me that as many as 15 to 25 percent of publicly supported camps have vacant bunk beds for boys and girls. There are vast numbers of poor youth who will never get near a camp unless you and others help raise funds to get them there.

I ask you to help mobilize financial support in every community. Cooperate with local Fresh Air funds. Set your goal at helping as many poor youth as possible to enjoy the immensely beneficial experience of camping.

• **Provide for year-round efforts.** We have learned from previous summers that it is essential that the benefits of summer programs be carried over into the fall, winter, and spring. Summer programs must be continued in the school year or merged into on-going, year-round efforts.

The poor youth of America are rich in potential, but poor in opportunity and in a sense of participation in American society. Now is the time to reach them, before they grow into adulthood marred by the indelible stigma of deprivation.

Cost Contractor's Liability for Damages

Frank Reda

[Editor's Note: The following article is reprinted from *The United States Air Force JAG Law Review*. Views and opinions expressed in the *Air Force JAG Law Review* are those of the author, and they are not necessarily concurred in by The Judge Advocate General of the Air Force.]

The right of a contractor to sue the Government for breach of contract damages has never been questioned. It has been reaffirmed in a plethora of recorded cases. Similarly, the right of the Government to sue a *fixed price* contractor for breach of contract damages is equally well recognized. Ample precedent exists.

Curiously, there is a marked scarcity of cases in which the Government has sought breach of contract damages against a *cost reimbursement* contractor. This fact is rather startling, especially since we have been engaged in cost contracting for half a century.

The Government's first experiment with cost reimbursement contracting took place early during World War I. While there was little resort to this form of contracting between the two world wars, it returned to popularity in 1940. At that time, the tremendous increase in war procurement, coupled with the recurrence of an unstable labor and material market, compelled the wide use of cost reimbursement contracting.[1] Although the current accent is on the use of fixed-price contracting, cost reimbursement contracting continues to be employed appreciably,[2] particularly in exotic research and development projects such as those encountered in space and missile programs.

[1] *Air Force Manual 110-9, Procurement Law, at 7-1, date 1 May 1964.*

[2] *Keyes, "The Responsibility of a Government Cost-Type Contractor," 22 Fed. Bar J. 68.*

Yet, despite the huge volume of cost reimbursement contracting experienced during the past 50 years, there has been an almost stark absence of damage suits filed by the Government against delinquent cost contractors. The author has been able to uncover only two such suits.[3]

This judicial void may well be symptomatic of underlying restraints *inherent* in cost-type contracts. It gives rise to the thesis that maybe the Government has no legal right to sue a cost-type contractor for breach of contract damages.

The soundness of this thesis will be examined here.[4]

Nature of Cost Contracts

It is often stated that government contracts are basically the same as contracts between individuals, and that the rights and liabilities of the parties are substantially the same as those of the parties to private agreements. Either party to a government contract is, of course, capable of breaking it. When this happens, the parties are usually subject to the same rules of law as are applied in a breach of contract between private parties.[5]

The common law right to damages for breach of contract is rooted in our Anglo-Saxon system of jurisprudence.[6] In the ordinary case, no question arises as to the right of an injured party to claim default damages. But a cost reimbursement contract presents a unique situation. It contemplates that the actual cost of the entire work *and the risks* are to be assumed by the Government. It guarantees that the contractor will emerge unscathed monetarily, *regardless of contingencies.*[7] Unlike the fixed price contractor, a cost reimbursement contractor is not generally permitted to include every contingency,[8] or risk, as part of his allowable costs of doing business.

Philosophical Restraints

The Comptroller General of the United States has the responsibility, among other things, of resolving disputes between the Government and contractor-claimants.[9] In the exercise of this responsibility, he has rendered a number of decisions touching upon the nature of a cost reimbursement agreement. On several occasions he has alluded to the proposition that such an agreement is a virtual *guarantee* against any loss to the contractor.[10] Yet, despite this broad assertion, he has indicated that there are limits to the Government's liability. He pointed out that a cost reimbursement agreement does not necessarily mean that the contractor is relieved of any and every loss.

Expanding on this premise, the Comptroller General established five tests which the contractor must meet before he can expect reimbursement of expenses: the expenses must be reasonably incident to the work; not presumed to be included in the fee;

[3] *United States v. Duggan, 210 F. 2d 926 (8th Cir. 1954); United States v. Bentley, 16 F. 2d 895 (2nd Cir. 1927).*

[4] *While this inquiry may be applicable generally to all Government departments utilizing cost reimbursement contracts, it is directed specifically to procurement by Department of Defense contracting agencies governed by the Armed Services Procurement Regulation (ASPR).*

[5] *Maxwell v. United States, 3 F. 2d 906 (4th Cir. 1925), affirmed without opinion, 271 U.S. 647 (1925).*

[6] *30 Comp. Gen. 191 (1950) and numerous authorities cited therein.*

[7] *20 Comp. Gen. 632 (1941).*

[8] *ASPR 15-205-7.*

[9] *31 U.S.C. 41-434.*

[10] *20 Comp. Gen. 632 (1941); 21 Comp. Gen. 466 (1941).*

serve a useful purpose in fulfilling contract requirements; *not result from the absence of due care by the contractor;* and not be in contravention of the law.[11] He added, somewhat significantly, that the benefits and liabilities of the contractor are dependent upon the terms of the contract, rather than upon the basis of any general theories relating to the nature of cost-type agreements.[12]

In one early opinion, the Comptroller General expanded specifically on the philosophical aspects of a cost reimbursement agreement. He took note of the tacit understanding that the cost of the work and the risks are assumed by the Government regardless of contingencies. He cautioned, however, that this does not permit the contractor to escape the costs of his own fault or folly; that the Government does not underwrite careless conduct or disregard of contractual duties; and that the provisions for reimbursement are not to be taken as a shield for incompetence.[13]

The frame of reference of these latter observations was a cost-plus-fixed-fee contractor's attempt to obtain reimbursement from the Government for damages the contractor was forced to pay to an injured third party. That case did not concern the question of a suit for breach of contract damages by the Government. However, the Comptroller General detected no underlying philosophical reason why a cost-type contractor should not be made to bear the financial burden of damages wrongfully inflicted upon a third party. Perhaps it would not be illogical to urge, *a fortiori,* that there is no underlying philosophical reason why a cost-type contractor should not be made to bear the financial burden of damages wrongfully inflicted upon the Government itself.

Judicial Precedent

Two cases could be found treating the subject of a cost reimbursement contractor's liability for breach of contract damages.[14] In 1927, the United States circuit court of appeals heard the case of *United States* v. *Bentley* in which the Government brought a suit for damages against a cost-plus contractor founded on an alleged breach of the contractor's contractual duty to "use its best efforts * * * to protect and subserve the interest" of the Government. The suit was denied, after full consideration on the merits, because of lack of proof. Significantly, no mention was made of the possibility that the cost contractor might be automatically insulated against a breach of contract suit for damages.

In 1954, the United States circuit court of appeals heard the case of *United States* v. *Duggan.* This case dealt with an appeal from an order of a district court dismissing with prejudice a claim of the United States against a cost-type contractor for, among other things, breach of contract damages. Because of the Government's success, a closer look at this case is warranted. The claim was based upon the contractor's default in the performance of a supply contract which obligated him to make and deliver 90 gliders and spare parts. The Government had agreed to pay all costs, plus fee, upon satisfactory delivery. The contractor failed to make deliveries as promised and, in consequence, he was terminated for default. Shortly thereafter the contractor was adjudicated a bankrupt and his assets were ordered to be sold. But before his assets could be sold, the contractor petitioned for reorganization as a subsidiary of another company.

Several proofs of claim were filed by the Government against the contractor in the reorganization proceedings, including a claim for damages stemming from the contractor's failure to deliver 89 of the 90 gliders promised. The Government claimed entitlement to excess costs generated by procuring the 89 gliders from another source.

The district court had dismissed the Government's claim for various reasons, one of which was that the right of recovery should have been settled administratively under the contract. The circuit court of appeals disagreed. That court found nothing in the "Termination" clause, or elsewhere in the contract, which provided for an administrative determination of the Government's claim for damages. The circuit court concluded that the Government had stated a claim which entitled it to a trial on the merits, and suggested that the Government would be able to collect damages on the basis of "any loss proximately resulting from the failure of the contractor to perform its obligations under the contract."

The case was remanded to the district court with directions to reinstate the Government's claim and to take further proceedings not inconsistent with the opinion handed down by the circuit court. The fact that a cost-type agreement was involved did not seem to disturb the circuit court or inhibit its decision.

These two decisions reign in solitary splendor. A void preceded them; a void followed them. One is at a loss whether to hail them as landmarks or to regard them as curious relics.

Taken at face value, the *Duggan* decision, at least, tends to support the proposition that there is no inherent philosophical objection to the Government's entitlement to damages against a delinquent cost-type contractor.

Purists may disagree. They might point out, with some propriety:

- That the precise issue of Government's entitlement to damages against a cost-type contractor was neither raised by the parties litigant nor squarely decided by the court.
- That, in any event, the damages there concerned *reprocurement costs,* which costs evidently are no longer assessable against a cost-type contractor.[15]

More recently, the Supreme Court of the United States observed in *obiter dictum:*

> . . . the cost-type contractor has undertaken contractual obligations. If he properly performs his contract, he earns his fee; if he does not, he may lose the contract, ***be liable for damages*** and be forced to liquidate the organization which was built to perform the contract."[16]

[11] *21 Comp. Gen. 466 (1941); 21 Comp. Gen. 149 (1941).*

[12] *22 Comp. Gen. 250 (1942).*

[13] *21 Comp. Gen. 149 (1941).*

[14] *Note 3, Supra.*

[15] *ASPR 8-407 provides, in part, that a "cost reimbursement type contract does not contain any provision for recovery of excess costs of reprocurement after termination for default." But see Air Force Procurement Instruction (AFPI) 8-601.53 which suggests that reprocurement costs may be pursued in some cost-type situations.*

[16] *United States v. Boyd, 378 U.S. 39 (1964).*

The issue then before the Supreme Court involved amenability of two cost reimbursement contractors to the Tennessee State sales and use taxes in connection with certain purchases made by them on behalf of the Atomic Energy Commission. It was argued by the contractors that they were engaged in furnishing services only; that they had no investment or risks under their cost-type contracts. This defense prompted the above-quoted reply of the court. To be sure, the court was not called upon to decide the question of a cost-type contractor's responsibility for breach of contract damages. The force of its observation is thereby diluted. Yet, it is a straw in the wind. It adds stature to the *Duggan* decision.

This slender chronicle of judicial precedent is not imposing. But it underscores the previously noted decisions of the Comptroller General. On balance, it might be fair to surmise that there is no philosophical reason why a cost-type contractor may not be answerable to breach of contract damages.

Contractual Restraints

Philosophy aside, it is imperative to examine the contract itself to learn whether a suit for damages will lie.[17] The parties may well have provided for *indemnification against default damages*, or for an *exclusive administrative remedy* in the event of default.[18] A contractual provision for either remedy, clearly and expressly stated, will prevent the Government from seeking relief in the courts.[19]

Indemnification. It was not unusual during World War II for cost-type contracts to contain an indemnity clause which had the effect of relieving the contractor from almost all financial responsibilities, including damages. A typical indemnity clause employed during that era read somewhat as follows:[20]

Responsibility of Contractor. It is the understanding of the parties hereto, and the intention of this contract, that all work under this contract is to be performed at the expense of the Government and that the Government shall hold the contractor harmless against any loss, expense (including expense of litigation), or damage (including liability to third persons because of death, bodily injury or property injury, or destruction or otherwise) of any kind whatsoever arising out of or in connection with the performance of the work under this contract, except to the extent that such loss, expense, damage or liability is due to the personal failure on the part of the corporate officers of the contractor, or other representatives of the contractor having supervisory or direction of the operation of the plant as a whole, to exercise good faith or that degree of care which they normally exercise in the conduct of the contractor's business.

Interpreting this clause, the Court of Claims held that the contractor would be "reimbursed for every sort of expense or liability incurred as a result of the carrying out of the contract, with the sole exception of such expenses as were incurred as a result of the Plaintiff's officers to exercise good faith or that degree of care which they exercised in carrying out their own business."[21] In short, the indemnity clause covered practically all contingencies and risks, apparently including breach of contract damages.

Indemnity clauses now in use are not quite so broad. They are invariably limited to particular losses and expenses; they contain no blanket waiver of the Government's right to sue for breach of contract damages. It would seem that a lower degree of legal responsibility was intended to be placed upon the contractor under earlier contracts which contained the broad indemnity clause, than would be the case with respect to the typical cost-type contracts now in use.[22]

Exclusive administrative remedy. In certain isolated elements of performance, current cost-type agreements establish an administrative avenue for the assessment of damages by the Government. Two examples are found in the *Government Furnished Property* clause[23] and in the *Inspection of Supplies and Correction of Defccts* clause.[24] Other examples might be found in the *incentive* features of cost-plus-incentive fee (CPIF) contracts. Under the CPIF concept, the contractor's failure to meet required delivery schedules or performance parameters can call for a downward readjustment of the fee.[25] In a real sense this may be classed as a form of administrative assessment of damages.

Apart from these few exceptions, cost reimbursement agreements now in use do not provide for administrative settlement of damages inflicted upon the Government. Liquidated damage clauses are not often employed.[26] Moreover, the "Termination" clause used in such agreements,[27] while available to the Government as a last resort, probably is

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[17] *22 Comp. Gen. 250 (1942).*

[18] *United States for Use and Benefit of Armco Drainage and Metal Products, Inc. v. Vander Heyden, 158 F. Supp. 930 (D.C.S.D. Ill. 1958).*

[19] *United States v. Paddock, 178 F. 2d 394; cert. den., 340 U.S. 813 (1950).*

[20] *Federal Cartridge Corp. v. United States, 77 F. Supp. 380 (1948); 24 Comp. Gen. 244 (1944).*

[21] *Federal Cartridge Corp., v. United States, supra note 20.*

[22] *Keyes, "The Responsibility of a Government Cost-Type Contractor," supra note 2.*

[23] *ASPR 13-703, Subparagraph (g).*

[24] *ASPR 7-203.5.*

[25] *See DOD Incentive Contracting Guide (1965).*

[26] *ASPR Scction VII, Parts 2 and 4; ASPR 18-113.*

[27] *ASPR 8-702(a).*

not meant to be its exclusive remedy. The Government could be in an awkward position if this were so. Some critical procurements are not susceptible of termination action. It would gain the Government nothing to terminate a *sole source* procurement. In other cases, it would sorely handicap the Government to terminate a procurement vitally needed where time will not allow reprocurement action. The Government is practically compelled to accept late deliveries in these two instances. Fairness dictates that the Government should be free to accept late deliveries and seek redress in damages, without having to resort to termination of the contract. While no precise authority can be cited to support this statement in the context of a cost reimbursement agreement, it is evidently implicit in the nature of all government contracts.[28]

In any event, if the Government is forced to resort to termination action, the standard "Termination" clause itself permits the Government to seek default damages. It states, in part, that the Government reserves the right to pursue "any claim which the Government may have against the contractor in connection with the contract."[29] Similar language has been held to constitute a reservation of the Government's right to sue for breach of contract damages.[30]

Estoppel

An alluring theory of estoppel is prompted by the recent Court of Claims decision in *Tektronix* v. *United States*.[31] The court came up with a rather interesting opinion. It suggested that *past inaction* could estop the Government from asserting present rights.

Tektronix, the owner of certain patents, had sued the Government for damages arising out of alleged unauthorized use of the patented inventions. In an unusual move, the Government filed a counterclaim against *Tektronix*, contending that *Tektronix* had used various government-owned patents without authority.

The court, in rejecting the counterclaim, reviewed the long-standing administrative practice of the Government in allowing free use of government-owned patents. The Court found that the Government had encouraged free, non-exclusive royalty-free licenses to anyone who applied for them. It has even permitted free use of its patents by those who failed to apply for licenses. In view of this long-standing and publicly announced administrative practice, the court held that there was tacit approval of *Tektronix's* use of the government-owned patents which constituted an *implied license* to use them.

The court compared this situation with the free use made of public lands prior to the enactment of statutes which authorized heads of departments to regulate the use of such lands. This privilege developed into an implied license growing out of the custom of nearly 100 years.

It probably can be argued with some logic that the Tektronix rationale will bar the Government from suing cost reimbursement contractors for default damages. It is an intriguing theory, but there are some flaws.

- There has been no publicly announced policy to the effect that damages will not be sought against delinquent cost-type contractors.
- There is no "long-standing administrative practice" to excuse cost-type contractors from default damages. True, the Government has rarely found it necessary to sue for damages. But it *has* done so.
- The Government's right to default damages was reiterated by the Supreme Court as recently as 1964.
- The paucity of lawsuits can perhaps be explained on a basis other than that of implied waiver. In earlier cost-type agreements, a broad indemnity clause had been inserted which protected the contractor against damage claims. More recently the contractor is permitted to obtain insurance protection against most types of damage risks,[32] and in some instances is now indemnified against particular loss or damage not compensated by insurance or otherwise.[33]
- The *Tektronix* decision turns on the premise that the Government had, in many ways, actually *encouraged* private use of government-owned patents. This premise obviously has no parallel in situations where the Government has been injured as a result of breach of contract.

The *Tektronix* rationale seems to be of doubtful application here.

Conclusion

Cost-type agreements now in general use evidently contain no *inherent* bar to the Government's right to breach of contract damages. While few authorities point directly to this conclusion, *no* authorities point directly to the opposite conclusion. The right of an injured party to seek default damages is fundamental. It cannot be lightly dismissed. In the absence of clear direction to the contrary, it should not be dismissed lest the sanctity of cost-type agreements be destroyed. It is recognized that many cost-type agreements call merely for the contractor's *best efforts* to meet schedule or performance goals. Failure to meet these goals under a *best effort* agreement would not, of course, constitute breach of contract. But where the contractor *has* solemnly promised to meet a stated delivery schedule or to attain a specified performance goal, he should be held to his promise.

From the contractor's point of view, default damages may well exceed the amount of fee. This is undesirable. It can lead to a lack of enthusiasm from industry for cost-type agreements. From the Government's point of view, the present

(*Continued on Page 39*)

[28] *ASPR 8-602.7, AFPI 8-601.51 (a), and Section 10-8 of AFM 110-9—all support the proposition that the Government may pursue damages against a delinquent contractor quite independently of the "Termination" clause. These references do not exclude cost reimbursement contracts.*

[29] *ASPR 8-702(a), Subparagraph (g). But note the more specific reservation contained in the "Termination" clause of* fixed price *contracts, ASPR 7-103.11:*

"The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract."

[30] *United States v. Duggan, supra note 3.*

[31] *Ct. Cls. No. 79-61, 15 Oct. 1965. Indebtedness is acknowledged to Mr. Joseph G. Twomey, Associate Counsel, Lockheed Missiles & Space Company, who suggested this theory.*

[32] *ASPR 15-205-16. These insurance costs are generally reimbursable.*

[33] *Ibid.*

MEETINGS AND SYMPOSIA

JUNE

Atomic Physics Conference, June 12–15, at New York University. Sponsors: Army Research Office—Durham, AEC, National Science Foundation, Air Force Office of Scientific Research, Office of Naval Research, New York University, Brookhaven National Laboratory and the International Union of Pure and Applied Physics. Contact: Robert Mace, Director, Physics Div., Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706, Phone (919) 286–2285.

Multivariate Analysis Symposium, June 17–22, at Dayton, Ohio. Cosponsors: Aerospace Research Laboratories and Wright State University. Contact: Dr. P. R. Krishnaiah (ARM), Aerospace Research Laboratories, Wright-Patterson AFB, Ohio 45433, Phone (513) 255–3761.

Bioastronautics and the Exploration of Space Fourth International Symposium, June 23–27, at San Antonio, Tex. Sponsor: Aerospace Medical Div., (AFSC). Contact: Dr. Mitchell (AMRS), Aerospace Medical Div., (AFSC), Brooks AFB, Tex. 78235, Phone (512) LE 2–8811, Ext. 3211.

JULY

High Temperature Chemistry Conference, (dates undetermined), in Crystal Springs, Wash. Sponsor: Office of Aerospace Research. Contact: Dr. Donald L. Ball, Air Force Office of Scientific Research (SRC), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4–5337.

Fourth Annual **Marine Technology** Society Conference and Exhibit, July 8–10, in Washington, D.C. Sponsor: Marine Technology Society. Contact: Ted Evans, Conference Management Organization, Inc., Sheraton Park Hotel, 2660 Connecticut Ave., N.W., Washington D.C. 20008.

Crystal Growth Conference, July 15–19, at the University of Birmingham, England. Sponsors: Air Force Cambridge Research Laboratories, U. K. Ministry of Technology, International Committee on Crystal Growth and the International Union of Pure and Applied Physics. Contact: Charles S. Sahagian (CRWB), Air Force Cambridge Research Laboratories, L. G. Hansom Field, Mass. 01730, Phone (617) 274–6100, Ext. 3298.

Aurora and Airglow Conference, July 29-Aug. 9, at the Agricultural College of Norway, As, Norway. Sponsors: Office of Aerospace Research, Office of Naval Research, Defense Atomic Support Agency and the Air Force Cambridge Research Laboratories. Contact: K. W. Champion, Air Force Cambridge Research Laboratories (CRUB), L. G. Hanscom Field, Mass. 01730, Phone (617) 274–6100, Ext. 3033.

AUGUST

Second International Conference on **Liquid Crystal,** (dates undetermined), at Kent, Ohio. Co-sponsors: Office of Scientific Research and Kent State University. Contact: Lt. Col. E. T. Walford, Office of Aerospace Research (SRC), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4–5337.

International Federation for Information Processing (IFIP) International Congress, Aug. 5–10, at Edinburgh, Scotland. Sponsor: Office of Aerospace Research. Contact: Mrs. R. W. Swanson, Air Force Office of Scientific Research (SRC), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4–5407.

Second National Conference on **Space Maintenance and Extra-Vehicular Activities,** Aug. 6–8, at Las Vegas, Nev. Sponsors: Air Force Aero Propulsion Laboratory, Ling-Temco-Vought, Inc., and the National Aeronautics and Space Administration. Contact: Mr. Clodfelter (APFT), Wright-Patterson AFB, Ohio 45433, Phone (513) 357–1110, Ext. 55875.

Body Temperature Regulation in Man Symposium, Aug. 19–24, at New Haven, Conn. Sponsor: Office of Aerospace Research. Contact: Dr. H. E. Savely, Air Force Office of Scientific Research (SRL), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4–5041.

Twenty-Fourth International Congress of **Physiological Sciences,** Aug. 25–30, in Washington, D.C. Sponsor: Office of Aerospace Research. Contact: Dr. H. E. Savely, Air Force Office of Scientific Research (SRL), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4–5041.

EASCON '68 in Washington D.C., Sept. 9–11

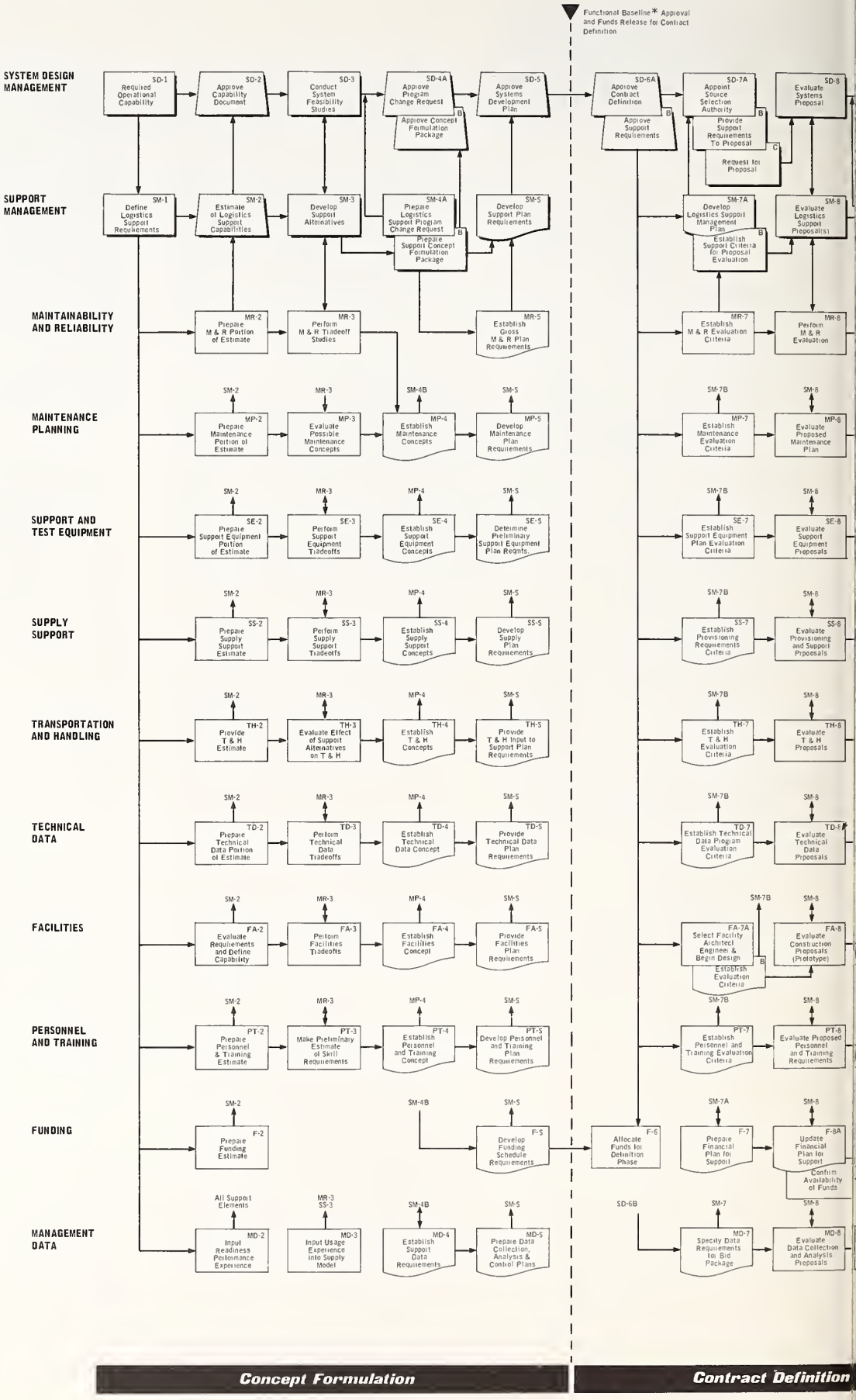
"The Changing World of Electronics" will be the theme of EASCON '68 Exposition (Electronics and Aerospace Systems Convention/Exposition) to be held Sept. 9–11, 1968, at the Sheraton Park Hotel, Washington, D.C.

The three-day conference and exposition will combine technical sessions and related displays to offer a balanced program on the latest developments in aerospace electronic systems and equipment.

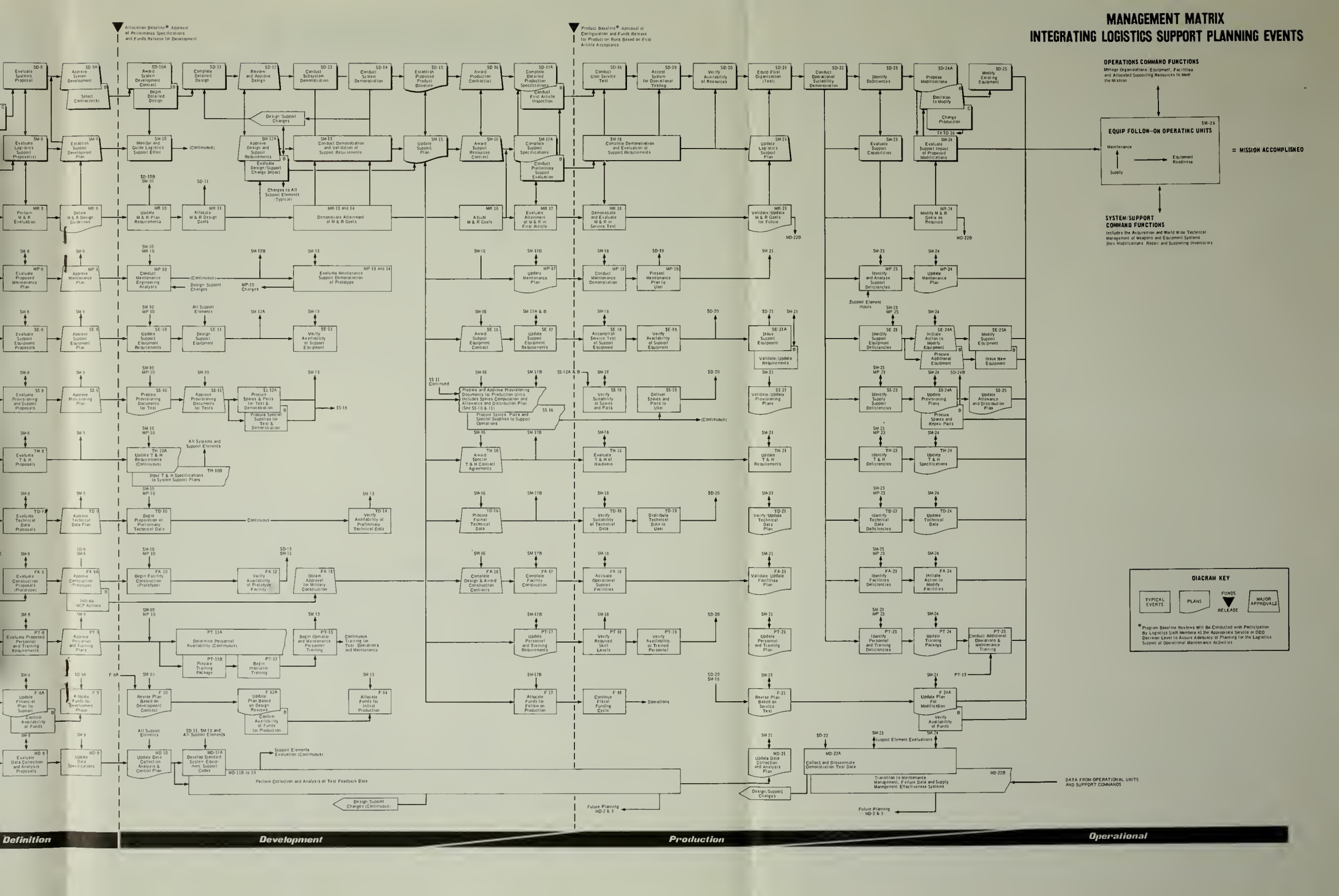
Sponsored by the Institute of Electrical and Electronics Engineers, the EASCON '68 Exposition will include technical sessions covering 12 major areas in the field of electronics, including communication, aeronautical, space and underwater systems.

Attendance at the technical sessions and the exposition is encouraged from Defense Department and other government agencies as well as the electronics industry. An advanced registration fee of $1 will be charged and a $2 entry fee will apply to government and military personnel attending the technical sessions. No registration fee will be charged for attendance at the exposition.

For further information on EASCON '68 Exposition, the contact is: Mrs. Harriet H. Manley, Page Communications Engineers, Inc., 3300 Whitehaven St. N.W., Washington, D.C. 20007, Phone (202) 337–7600.


Functional Baseline * Approval and Funds Release for Contract Definition
SYSTEM DESIGN MANAGEMENT
SD-1 Required Operational Capability
SD-2 Approve Capability Document
SD-3 Conduct System Feasibility Studies
SD-4A Approve Program Change Request
Approve Concept Formulation Package
SD-5 Approve Systems Development Plan
SD-6A Approve Contract Definition
Approve Support Requirements
SD-7A Appoint Source Selection Authority
Provide Support Requirements To Proposal
Request for Proposal
SD-8 Evaluate Systems Proposal
SUPPORT MANAGEMENT
SM-1 Define Logistics Support Requirements
SM-2 Estimate of Logistics Support Capabilities
SM-3 Develop Support Alternatives
SM-4A Prepare Logistics Support Program Change Request
Prepare Support Concept Formulation Package
SM-5 Develop Support Plan Requirements
SM-7A Develop Logistics Support Management Plan
Establish Support Criteria for Proposal Evaluation
SM-8 Evaluate Logistics Support Proposal(s)
MAINTAINABILITY AND RELIABILITY
MR-2 Prepare M & R Portion of Estimate
MR-3 Perform M & R Tradeoff Studies
MR-5 Establish Gross M & R Plan Requirements
MR-7 Establish M & R Evaluation Criteria
MR-8 Perform M & R Evaluation
MAINTENANCE PLANNING
MP-2 Prepare Maintenance Portion of Estimate
MP-3 Evaluate Possible Maintenance Concepts
MP-4 Establish Maintenance Concepts
MP-5 Develop Maintenance Plan Requirements
MP-7 Establish Maintenance Evaluation Criteria
MP-8 Evaluate Proposed Maintenance Plan
SUPPORT AND TEST EQUIPMENT
SE-2 Prepare Support Equipment Portion of Estimate
SE-3 Perform Support Equipment Tradeoffs
SE-4 Establish Support Equipment Concepts
SE-5 Determine Preliminary Support Equipment Plan Reqmts.
SE-7 Establish Support Equipment Plan Evaluation Criteria
SE-8 Evaluate Support Equipment Proposals
SUPPLY SUPPORT
SS-2 Prepare Supply Support Estimate
SS-3 Perform Supply Support Tradeoffs
SS-4 Establish Supply Support Concepts
SS-5 Develop Supply Plan Requirements
SS-7 Establish Provisioning Requirements Criteria
SS-8 Evaluate Provisioning and Support Proposals
TRANSPORTATION AND HANDLING
TH-2 Provide T & H Estimate
TH-3 Evaluate Effect of Support Alternatives on T & H
TH-4 Establish T & H Concepts
TH-5 Provide T & H Input to Support Plan Requirements
TH-7 Establish T & H Evaluation Criteria
TH-8 Evaluate T & H Proposals
TECHNICAL DATA
TD-2 Prepare Technical Data Portion of Estimate
TD-3 Perform Technical Data Tradeoffs
TD-4 Establish Technical Data Concept
TD-5 Provide Technical Data Plan Requirements
TD-7 Establish Technical Data Program Evaluation Criteria
TD-8 Evaluate Technical Data Proposals
FACILITIES
FA-2 Evaluate Requirements and Define Capability
FA-3 Perform Facilities Tradeoffs
FA-4 Establish Facilities Concept
FA-5 Provide Facilities Plan Requirements
FA-7A Select Facility Architect Engineer & Begin Design
Establish Evaluation Criteria
FA-8 Evaluate Construction Proposals (Prototype)
PERSONNEL AND TRAINING
PT-2 Prepare Personnel & Training Estimate
PT-3 Make Preliminary Estimate of Skill Requirements
PT-4 Establish Personnel and Training Concept
PT-5 Develop Personnel and Training Plan Requirements
PT-7 Establish Personnel and Training Evaluation Criteria
PT-8 Evaluate Proposed Personnel and Training Requirements
FUNDING
F-2 Prepare Funding Estimate
F-5 Develop Funding Schedule Requirements
F-6 Allocate Funds for Definition Phase
F-7 Prepare Financial Plan for Support
F-8A Update Financial Plan for Support
Confirm Availability of Funds
MANAGEMENT DATA
All Support Elements
MD-2 Input Readiness Performance Experience
MR-3 SS-3
MD-3 Input Usage Experience into Supply Model
MD-4 Establish Support Data Requirements
MD-5 Prepare Data Collection, Analysis & Control Plans
SD-6B
MD-7 Specify Data Requirements for Bid Package
MD-8 Evaluate Data Collection and Analysis Proposals
Concept Formulation
Contract Definition

MANAGEMENT MATRIX
INTEGRATING LOGISTICS SUPPORT PLANNING EVENTS



Research Reports

Authorized DOD contractors and grantees may obtain these documents without charge from

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

Others may purchase these documents at a price of $3 each (microfiche 65¢) unless otherwise indicated, from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Naval Gunfire Support. This U.S. Marine Corps manual contains information and guidance concerning the organization, command relationships, and planning considerations for naval gunfire support in amphibious operations. 1967. 171 p. il. D214.9/4:7–2/2. $1.25.

Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E. Defense Documentation Center, Cameron Station, Alexandria, Va., March 1968, 18 p. Order No. AD–667 000.

A Summary of the State of the Art in Microfilm Document Storage and Retrival Systems. Rome Air Development Center, Griffiss AFB, N.Y., Sept. 1967, 113 p. Order No. AD–820 127.

Oceanographic Comment on Apollo 501 Mission Photography. Texas A&M University, College Station, Tex., for the Navy, Nov. 1967, 92 p. Order No. AD–663 457.

Sixth Annual Technical Report: Expanded Research Program in Materials Sciences for Period July 1, 1966 through June 30, 1967. University of Chicago, for the Advanced Research Projects Agency, Dec. 1967, 88 p. Order No. AD–663 152.

Oxygen-Corner-Expansion Flows with Coupled Vibrational and Dissociational Nonequilibrium. University of Toronto, Canada, for the Air Force, Dec. 1967, 78 p. Order No. AD–663 244.

A Study of Penetration of a Liquid Injectant into a Supersonic Flow. Aerospace Corp., El Segundo, Calif., for the Air Force, Oct. 1967, 39 p. Order No. AD–663 417.

Impurity Photoionization Theory of Precursors. Polytechnic Institute of Brooklyn, for the Navy, Oct. 1967, 38 p. Order No. AD–663 145.

Calibration of Hot-Film Sensors in a Towing Tank and Application to Quantitative Turbulence Measurements. U.S. Naval Academy, March 1967, 55 p. Order No. AD–663 098.

A Review of Ceramic Thin Film Technology. General Precision Systems, Glendale, Calif., for the Air Force, Oct. 1967, 167 p. Order No. AD–660 590.

Preparation and Characterization of High Quality Single Crystal Refractory Metal Carbides. Westinghouse Electric Corp., Pittsburgh, Pa., for the Air Force, Oct. 1967, 77 p. Order No. AD–663 248.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

U.S. Government Organization Manual 1967–68. Presents essential information about government agencies and provides supplemental information including brief descriptions of quasi-official agencies and selected international organizations. Also lists several hundred representative publications showing the types of published materials available from Government establishments. GS 4.109:967. $2.

Department of Defense Security Posters (size 22 x 14 inches): Do You Take Security Regulations Seriously Enough? D 7.19:5220.2. 10¢; **Security is Always in Season.** D 7.19: 5220.3. 15¢; **Let's Face It, Security is Up to You.** D.7.19:5220.4. 15¢; **Don't Guess, Ask Your Security Supervisor.** D 7.19:5220.5. 15¢; **Security Takes No Vacation.** D 7.19: 5220.6. 15¢; **You Can't Pass it, Security is an Individual Responsibility.** D7.19:5220.7. 15¢.

MILSCAP, Military Standard Contract Administration Procedures. Prescribes standard procedures for use in exchanging procurement/contract administration data between purchasing offices and field contract administration offices. Basic Manual. 1967. 211 p. D 7.6/4:M59/3. $1.25. Change 1. 1967. 78 p. D7.6/4:M59/3/ch.1 40¢.

DOD Annual Report for FY 1965. Includes annual report of the Secretary of Defense for FY 1965, together with the reports of the Secretaries of the Army, Navy, and Air Force for the same period. 1967. 445 p. il. D1.1:965. $1.75.

Fire Support Coordination. This U.S. Marine Corps manual provides doctrine, tactics, and techniques for the coordination of fire support during amphibious operation and subsequent operations ashore. 1967. 236 p. il. D214.9/4:7–1. $2.50.

Defense Procurement Circulars

Distribution of Defense Procurement Circulars is made automatically by the U. S. Government Printing Office to subscribers of the Armed Services Procurement Regulation (ASPR).

Defense Procurement Circular No. 60, April 1, 1968. (1) Expiration of Deviations from ASPR and DOD Publications. (2) Relationships with Defense Contractors. (3) Use of Government-Owned Industrial Plant Equipment by Contractors. (4) Use and Charges Clause 7–702.12. (5) Index of 100 Parent Companies Which with Their Subs, etc. (6) Material Inspection and Receiving Report (MIRR) (DD 250). (7) Disposition of Post Award Audits. (8) Master List of Contractors for Negotiated Overhead Rates and Advance Agreements for Independent R&D Costs. (10) Pricing of Technical Data.

INTEGRATED LOGISTIC SUPPORT

Excerpts from address by Honorable Thomas D. Morris, Asst. Secretary of Defense (Installations and Logistics), at the Electronic Industries Assn. Symposium on Integrated Logistic Support, Washington, D. C., on March 7, 1968.

There is sharply increased emphasis on the importance of military readiness and rapid response to the support of our deployed forces, as well as on more careful management of our national resources.

Therefore, this symposium is of even greater significance than it was just a few weeks ago. I do not mean by this that we should expect to accomplish any miracles in the near future in terms of translating our dream of integrated logistic suppport into dramatic accomplishment. I do feel, however, that today's environment lends a new sense of urgency to our discussions, and that this should cause all of us to find creative solutions more quickly.

* * *

I think it important that we make it clear to you that in enlisting industry support of the concept that we have come to describe as "Integrated Logistic Support," we are not trying to invent a new way of forcing our contractors to assume new cost penalties or financial risks. Rather, I view our objective in this program as that of learning and applying lessons gleaned from our mutual experience in the maintenance and support of weapon systems. These lessons should teach us what actions are required during design and development in order to simplify the operation and support of our systems downstream *i.e.*, when they reach the hands of the soldier, sailor and airman, and particularly when these men are under the stress of combat.

* * *

. . . Those of us concerned with design, development, procurement, production, supply and maintenance must continuously keep in mind the needs of those who will operate, supply and maintain the equipment, and consciously seek to meet these needs. In preparing our cost-effectiveness analyses, we must include in the "cost side" of the equation the cost of supply, maintenance and down-time; and we must include in the "effectiveness side" of the equation the value of greater operational up-time, and longer mean-time-between-failure.

DOD Directive 4100.35, the charter for integrated logistic support (ILS), makes it clear that, in addition to a plan for the operational performance of a new system, there needs to be a companion plan for its logistic support. As development proceeds, these plans must be constantly meshed if the system is to achieve optimum effectiveness.

All of us have shared a sense of frustration in why it is proving so difficult to translate this obviously desirable and fundamental concept into reality. Our procurement people have undoubtedly shied away from proceeding too quickly because of their reticence to increase procurement costs, without the ability to clearly foresee and predict the logistic economies which may emerge over the programmed life of a new weapon system. These are, of course, valid fears. The fact that the directive states that the costs of developing ILS "shall be recognized as inherent in the overall cost for delivery of an operationally effective system . . ." does not by itself alleviate these fears. I suggest that the best way to overcome this reticence is to have a convincing demonstration, by documented cases, of the costliness of our failures to apply ILS concepts; and of the values of insisting upon the proper marriage of the operational plan and the logistic support plan in new systems.

Hon. Thomas D. Morris

It is for this reason that I have been goading myself and my associates to seek out evidence which will be so dramatic that every skeptic among us, and among those who will be quick to criticize us, can be made a convert. I was recently furnished several examples which may be worth citing to illustrate what I hope may come out of this symposium—that is a better ability to articulate not only the benefits but, in fact, the essentiality of full application of the ILS idea.

SUPPORT SAVINGS

In one case, the airborne digital computer of the fire control system of the F–106 aircraft began requiring excessive support resources. Redesign of this 1956 state-of-the-art system resulted in estimated annual savings—in terms of maintenance man-hours and logistic support costs—in excess of $3.5 million. The 200,000 maintenance man-hour savings annually are significant in themselves. The high cost of repair, and the obvious change in the state of the art, were

the motivating factors here. It would be interesting to know how many more systems are approaching this status. They would certainly seem to offer a fertile field for exploration.

In the case of the F–111, it was recognized that, because of its unique characteristics, the F–111 would benefit from a continuing analysis and evaluation of support requirements prior to completion of the engineering/design phase. Fifty-four specific design changes were made to improve equipment support and to achieve the goal of 35 maintenance man-hours per flight hour. Overall savings attributable to these improvements are almost $92 million.

One of the design changes eliminated 250 rivets in the engine inlet shield, thereby precluding possible foreign object damage. While it may cost more to produce the revised inlet shield, the offsetting benefits in reduced repair time and increased operational time are substantial. I wonder whether more such improvements could have been conceived if logistic support had been given greater consideration during the early conceptual phase of the program.

Grumman Aircraft Engineering Corp. has reported a very interesting case based on contracts it had for two aircraft requiring carrier space—the A-6A and the E-2A. The critical manpower requirements and limited space were prime constraints. This gave Grumman the idea of designing common support equipment for the two aircraft. Perhaps we should deliberately seek to impose more such logistic restraints during the design stage in order to cause explicit consideration of the logistic support environment. The concept of common test equipment, tooling and facilities might be applied generally to airborne equipment, motor vehicles, ordnance items, and ships programs. . . .

The redevelopment of the Hawk missile to accommodate the Wooden Round concept has some interesting features that warrant careful observation. The objective of this concept is to design an anti-aircraft guided missile that will not require any operation or power applied prior to launch. This no-support is required at organizational or field levels, with a sharp reduction in maintenance manpower and space requirements. This is what we are trying to achieve.

The Hawk illustration also represents the redesign of existing equipment, and the ability to incorporate new ideas based upon actual experience with a system. It would seem that redevelopment programs to extend the life of equipment between overhaul, or perhaps eliminate the need for such overhaul during its life cycle, represent a significant opportunity to conserve logistic support resources.

Another interesting development that has been taking place, particularly in the electronics industry, is the plug-in type component modules facilitating replacement in the event of failure. Obviously, the down-time of a system using such modules is negligible. This is a tremendous development that has been possible only as the state of the art has progressed through miniaturized, solid state circuitry.

These illustrations were obtained by an Industry-DOD Task Team. One can hardly look at such illustrations without wondering whether we should be seeking systems requiring "no maintenance." For example, is the possibility of a 4,000-hour "no overhaul" aircraft worth considering? What would it cost? Would the development and production costs be prohibitive, or would they be reasonable in relation to the support resources saved and the increase in hours available for operational use?

Which components of our systems should designers attack first so as to reduce support time and costs? To what extent can the "plug-in" module concept of repair now used in electronics be extended to other components?

EARLY PLANNING PAYS OFF

The pay-offs from ILS are of such magnitude that we must obviously do a more effective job of analyzing and planning at the outset of new weapon programs. In addition to stressing logistic support during the conceptual and design phases, we should also be seeking more effective use of existing support facilities, equipment and resources through product improvement programs for existing major systems.

The Office of the Secretary of Defense and the Military Services are working on these and other ideas.

The Office of the Director of Defense Research and Engineering is preparing development concept papers on every major development program. These papers incorporate consideration of production and logistic support matters during the program approval process. This is a major step forward.

A task force under the Joint Logistics Chiefs is now at work on procedures to assure that logistic support arrangements for multi-Service aircraft are thoroughly considered during the design and development stage.

A document entitled, "DOD Systems and Equipment Integrated Logistic Support Planning Guide," will be reviewed with you. This guide promises to provide important procedural knowledge for DOD managers. It will be available to industry by the fall, after having been reviewed by several industry associations and the Military Services.

An Industry-DOD Integrated Logistics Support Committee is being formed. This group has been asked to work with us for the next year to further illustrate the benefits that can be achieved through ILS, and to develop recommendations affecting the contractor-customer interface. We expect much from this group.

In conclusion, I wish to pay my compliments to the many members of industry who have already assisted us in making progress in this field. I assure you that it is the objective of those of us in the Office of the Secretary of Defense and in the Military Services to act upon the results of this work and to foster continued efforts with industry. In summary, we need no more authority and directives to hasten our progress, but we do need greater understanding on the part of all concerned, and practical proof of what can be accomplished.

INTEGRATED LOGISTIC SUPPORT— ITS NECESSITY AND ACCOMPLISHMENT

Address by Dr. Finn J. Larsen, Principal Dep. Dir. of Defense Research and Engineering, at the Electronic Industries Assn. Symposium on Integrated Logistic Support, Washington, D.C., March 7, 1968.

I have been asked to consider integrated logistic support (ILS) from a research and development viewpoint. I should like to do so in light of our experience in Vietnam as well.

We, both Government and industry, have been making progress during recent years in the reliability, maintainability and logistic support aspects of the equipment and systems that are developed for service use. The Vietnam war has provided even greater emphasis to these efforts. As we consider the tactics used in Vietnam or compare our forces with the enemy's, we come to the conclusion that our soldiers, marines and airmen are increasingly dependent on equipment, much of which is quite complex.

Fortunately, it is not our policy to meet the Viet Cong on a man-for-man basis. Our philosophy is to make use of superior firepower, sophisticated equipment, better machines, insofar as this is possible. Electronic intrusion devices, complex aircraft with multi-purpose avionic systems—even our combat boots are specially designed rather than being sneakers—all these are in everyday use by our forces in Southest Asia. We are trying to use technical superiority and industrial might, rather than numbers of men to win our battles.

I am not detracting from the American soldier. As always his skill, initiative and valor make him one of the finest soldiers in the world. Our function—yours and mine—is to amplify every soldier by giving him the equipment that makes him superior to several enemies, not just one.

It is evident from statistics on the ratio of enemy battle losses to ours—five to one or better—that this policy of reliance on equipment is sound. But the enemy is not standing still. Recently he, too, has begun to use more sophisticated devices. Witness his use of armor recently in the Lang Vei area, and again near Saigon.

Our reliance on sophisticated equipment, rather than sheer manpower, emphasizes the necessity for good logistic planning, and places real importance on the integration of logistic considerations in the design process. Maximum reliance on equipment dictates an even greater responsibility than ever before for better maintainability, greater reliability, and more effective logistic support. Our weapon systems and equipment are of no value unless they are ready for use when needed. Equipment must not only have excellent performance when it is operating, but it must operate without failure. Those of us in Government believe that the way to achieve good supportability and economy is by considering logistics early and assuring that the basic hardware, the support equipments, the personnel and training, the technical data—the whole system—has logistic considerations designed into it.

Balance Performance, Logistics

In the not too distant past, our systems and equipments were designed primarily to achieve operational performance—"pure" performance characteristics, such as range, speed and payload. These are still vitally important in attaining superiority. But logistic aspects were often considered after the design was so far along that significant changes could not be made. In some instances, designs have resulted in severe logistic penalties. We have recognized that the emphasis was too far in the direction of operational performance. We are now emphasizing logistic considerations, not with the intention of swinging completely in the other direction—maximum consideration of logistics and inadequate consideration of operational performance—but rather to achieve a proper balance. In order to achieve that balance, it is necessary to consider early in the design process all aspects of performance, logistics and economics which establish the performance and logistic standards and, through judgment and trade-off analysis, to set the proper balance.

Dr. Finn J. Larsen

In reading DOD Directive 4100.35, it is evident that the architects of the integrated logistic support concept mean "integrated." They mean integration of the various elements of support—personnel, technical data, support equipment, spares, etc. To a member of the research and development community, it may be more appropriate to speak of I²LS—a reiterative integration—rather than ILS. The first integration is that definitely intended by the authors. The second integration is the integration of logistic considerations in the design process. Unless logistics is an inherent part of the design process, and logistics is designed into the product, major logistic problems will continue to plague us.

We have recently completed a study of manpower-equipment considerations. How do we achieve the proper balance between the use of men and equipment? How do we obtain the best interface between them? We concluded that the only effective way to accomplish our goals is to ensure adequate consideration of manpower factors early in the development, to make trade-off studies during the conceptual and contract definition phases, and to integrate the results in the design process. Logistic aspects are identical to man-machine problems in this respect. The key to adequate logistic support is to integrate the logistic requirements into the design process—to plug it into systems engineering.

ILS Policies

Let us examine our ILS accomplishments, our policies, and the direction of our progress. Let me give you some specifics. We have in being a number of policies and practices that promote improved logistic support; for example, the concept formulation/contract definition policies enunciated by DOD Directive 3200.9. It is clearly the intent of these policies that logistics be considered early in the conceptual stages, and that logistics be a major factor in contract definition and development. One prerequisite of engineering development is that the remainder of a program be engineering rather than research—that the technology be well in hand before an engineering or operational systems development program is launched. This prerequisite is aimed at a number of objectives including the prevention of major logistic support problems. Another fundamental aspect of the concept formulation/contract definition policy is that system trade-offs be made. I quote:

"Trade-offs should be used to obtain, with the mission and performance envelopes, an optimum balance between total cost, schedule, and operational effectiveness for the system. In this context, . . . operational effectiveness includes all factors influencing effectiveness in operational use (such as 'pure' performance, reliability and maintainability); and system includes the hardware itself and all other required items; such as facilities, personnel, data, training equipment, etc."

The current policy of the Director of Defense Research and Engineering on reporting of major developments (outlined in DOD Instruction 3200.6) provides for Technical Development Plans (TDP) and requires that the plans include:

- Operational information that affects reliability and maintainability design.
- Planning information needed for reliability and maintainability design.
- Plans for a reliability program outlining how reliability will be achieved.
- Plans for a maintainability program outlining how maintainability will be achieved.

Quantitative information on characteristics, such as turn-around time, planned utilization rate, mean-time to return to service, and minimum allowable time between scheduled maintenance, is also expected to be provided in the TDP.

The DOD policy on System Project Management (DOD Directive 5010.-14) references the ILS directive (4100.35) and states:

"Logistic support planning shall be accomplished concurrently with other system/project effort. The logistics organizations identified in the System/Project Manager Charter and in the approved, negotiated System/Project Master Plan will assist the System/Project Manager in support planning and in developing transition agreements."

The Office of the Director of Defense Research and Engineering has actively engaged in the generation of several DOD standards that promote more effective logistic support. These include Mil-Standards 470, 471 and 785 dealing with maintainability program requirements, maintainability demonstration, and a reliability program.

There are several other recent policies and practices that we have been working on in cooperation with the Assistant Secretary of Defense (Installation and Logistics) and his staff: total package procurement and life-cycle costing. I believe that these will focus more attention on the logistic aspects and will help in achieving better logistics support. In mentioning total package procurement, may I insert a word of caution about its application. Total package procurement is not the appropriate method for procuring all major items. It was an excellent choice for the C–5A because of its relative simplicity and the fact that its design was within the state of the art. Total package procurement is not a good choice for an advanced, complex aircraft.

In the list of policies and practices that currently exist, I want to mention a very important directive. This is the DOD policy on the use of microelectronics in military equipment and systems. This policy requires that all new projects in advanced, engineering and operational systems development "consider the use of microelectronics technology in their design . . . with the view of maximizing reliability and minimizing total cost of ownership . . ." That policy is expected to have a major impact on maintenance and logistic support. Throughout this policy, concepts such as "module discard-on-failure" and "logistics self support" will be used much more extensively. I am confident that increased use of microelectronics will result in major improvements in both operational performance and in logistics effectiveness.

We have been talking about policies that will lead to improved logistics. How have these policies worked? Have they reduced or simplified maintenance, reduced personnel, or training requirements, or improved some other aspect of logistics? A good and very recent example of the effect of these policies is the Fast Deployment Logistic (FDL) Ship contract definition in which there was great emphasis on life-cycle costs and cost effectiveness. During contract definition, the civilian crew requirements were reduced from 52 men to 37 per ship as a result of trade-off studies to optimize the complete ship system for its anticipated life.

An example of the results that can be achieved in hardware design is the C–5A landing gear. During the course of the landing gear design there were a number of decisions made that clearly will improve logistics. For example, an initial design approach to the kneeling mechanism was a complex series of spur and worm gears. Under the pressures of the total package contract to provide lighter weight and more reliability, the design was changed to a very simple chain drive actuated by an air motor. It is expected that reliability and maintainability will both be improved and the number of spares procured will be reduced. Another decision during the landing gear design was to scrap a concept that would have made wheel removal difficult and go to an entirely new design. This was a major and expensive change that will improve C–5A supportability. Another example in the same aircraft is the change from conventional mechanical couplings in the hydraulic lines to sleeve welding. The welding creates a more leakproof joint over the lifetime of the aircraft and will reduce maintenance.

Where ILS Is Going

Let us consider the second part of the topic—what is our direction? I believe that there are several activities that the Office of the Director of Defense Research and Engineering is working on to improve the effectiveness of logistic support:

- A policy on systems engineering.
- A policy on configuration management.
- A policy on reporting of major development programs including requirements for Technical Development Plans.

A Work Breakdown Structure (WBS) policy and standard currently under consideration recognizes the importance of ILS by accommodating the elements of ILS in the Summary Work Breakdown Structure. However, in line with our desire to integrate logistic planning and requirements in the design process, ILS has not been made a separate item in the WBS. Rather the individual ILS elements are expected to be accommodated in WBS elements, such as system engineering, common support equipment, peculiar support equipment, data, training, etc.

With regard to system engineering, we are attempting to develop output-oriented (*i.e.*, not proceduralized) systems engineering practices. It is intended that these practices be applied in procurement to insure a completely integrated engineering effort including the integration, by the contractor, of all the support factors (logistics, human factors, etc.). The objective is to adequately consider logistic support factors during system engineering and design.

Our policy on configuration management will provide a maximum degree of design and development latitude, yet introduce at the appropriate time the degree and depth of control necessary for production and logistic support. We believe that these configuration management policies and practices will result in the following benefits to logistic support effort:

- Fewer changes will occur because of more stringent criteria for evaluating proposed changes, including the impact of all aspects of a proposed change on logistics.
- Changes to improve logistics will be emphasized since one kind of change permitted is that which significantly improves logistic support.
- Better knowledge and visibility of the configuration.
- More orderly implementation of all aspects of an approved change, including technical data, training, etc.

There have been significant problems in the past when an engineering change was approved and implemented for the prime mission equipment without accompanying changes in handbooks, test equipment, training, etc.

We are considering a number of changes in the DOD policy on reporting of major development programs that currently require a Technical Development Plan. Of special interest is a proposed change to require reference to an Integrated Logistic Support Plan (if there is one), and inclusion in a quarterly report on the status of the project, a qualitative rating of four areas: operational and technical, financial, schedule, and logistics. I believe that this will be the first time that a status report on development will put logistics on a equal footing with these other factors.

After having discussed the status and direction of programs related to ILS, let me emphasize a few additional points:

First, on each major program, we need to establish a working relationship between the logisticians (including maintenance engineers) and the analysts and designers. And we need to do it early in development.

If the logisticians generate a logistic concept and follow this by a statement of tentative logistic requirements, the designers and analysts can enter into the trade-off studies and analyses that are made in the conceptual phase of development. An early consideration of logistics, and continuing consideration during the development, should achieve the proper balance between operational, economic and logistic factors that is our goal.

Second, we need better data and better tools for an early assessment of the logistic impact. We can do reasonably well in estimating operational performance ("pure" performance), development costs and, to a lesser extent, production costs. However, our ability to estimate operational and maintenance consequences, including their costs, is very poor. Related to this is the need to evaluate proposals and make selections by considering the total program, including logistics.

Thirdly, we need to write contracts that motivate the contractor to optimize the total system and total costs. One approach is total package procurement. We will use it when it is appropriate. To establish motivation, figures of merit or total program measures of effectiveness are needed. An example is the measure used for the FDL ship:

$$\frac{\text{speed x payload}}{\text{life cycle costs.}}$$

Lastly, we must train and use logisticians. They must work with the analysts and designers, and must participate in the review of the development program as it progresses.

I want to emphasize a point on which there may be some differences of opinion between the logisticians and developers. We in research and development believe that the way to get better logistic support is not through a large independent organization that is concerned with ILS, but rather by assuring that the program manager has within his organization the required logisticians. We believe that achievement of integrated logistic support is dependent upon integration of logistic considerations and logistic planning into current organizations and activities, particularly the systems engineering process.

In summary, the Office of the Director of Defense Research and Engineering strongly supports the need for integrated logistic support. We believe that effective logistic support can be achieved by early and extensive cooperation between the designers and the logisticians. When the designers and the logisticians make program decisions based on the full military and economic consequences of their actions, the result will be superior force effectiveness. Our fighting men will have weapons that will be effective on the day they are fielded and every day thereafter.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

George McKee Elsey has been appointed Special Asst. to the Secretary and Dep. Secretary of Defense succeeding **John M. Steadman**, who became the General Counsel for the Air Force.

Richard C. Solibakke has been appointed Chairman of the Armed Services Board of Contract Appeals. The appointment was made pursuant to the Board's charter by the Asst. Secretary of Defense (Installations and Logistics) and the Asst. Secretaries of the Military Departments responsible for procurement.

Ronald A. Moser has been appointed to the newly-created position of Special Staff Asst. to the Dir., Armed Forces Radiobiology Research Institute, Defense Atomic Support Agency, Bethesda, Md.

Melvin H. Baker has succeeded **Don R. Brazier** as Comptroller at Defense Supply Agency Headquarters.

Capt. Shannon D. Cramer Jr., USN, selected for promotion to rear admiral, has been named military assistant to the Asst. Secretary of Defense (Public Affairs).

DEPARTMENT OF THE ARMY

Maj. Gen. Paul A. Feyereisen, Program/Project Manager for the MALLARD Project, and Dep. Command General of the Army Electronics Command for Tactical Communication Systems, Fort Monmouth, N.J., was promoted to his present rank on April 1.

William K. Brehm has been sworn in as Asst. Secretary of the Army for Manpower and Reserve Affairs.

Brig. Gen. Felix J. Gerace has been appointed Commanding General of the U.S. Army Natick Laboratories, Natick, Mass.

The U.S. Army Weapons Command, Rock Island, Ill., has appointed the following new commodity managers:

Maj. Andrew C. Johnson, armament systems for the AH–1G (Huey Cobra) helicopter; **Lt. Gary A. Eberhardt**, armament systems for the UH–1B, C and D helicopters; **K. Jay Leonard**, OH–6A, OH–13, OH–23, and CH–47 helicopters; **Wayne A. Uchtorff**, automatic guns and grenade launchers (aircraft); and **Albert D. Hass**, armament systems for the AH–56A (Cheyenne) helicopter.

DEPARTMENT OF THE NAVY

RAdm. Jack J. Appleby, SC, Dep. Commandant of the Industrial College of the Armed Forces has been named Commanding Officer, Naval Supply Center, Oakland, Calif.

RAdm. John W. Bottoms, SC, Executive Dir., Supply Operations, Defense Supply Agency, has been named Commanding Officer, Naval Supply Center, Norfolk, Va.

RAdm. Lucien B. McDonald, former Commander, Military Sea Transportation Service, Far East, has been assigned as Dep. Chief of Staff for Logistics and Management, Commander-in-Chief, U.S. Atlantic Fleet.

RAdm. Walter F. Schlech Jr., has been selected as Commandant, Military Sea Transportation Service, Atlantic.

The following captain assignments have been announced by the Chief of the Bureau of Naval Personnel:

Capt. William W. Barrow, CEC, Commanding Officer, Naval Public Works Center, Newport, R.I.

Capt. Stuart J. Evans, SC, Officer-in-Charge, Navy Purchasing Office, Los Angeles, Calif.

Capt. Harmon R. Joy, Commanding Officer, Naval Ordnance Station, Louisville, Ky.

Capt. William A. Johannesen, SC, Commanding Officer, Naval Supply Depot, Guam.

Capt. Richard P. Pawson, SC, Officer-in-Charge, Navy Purchasing Office, Alexandria, Va.

DEPARTMENT OF THE AIR FORCE

J. William Doolittle has been sworn in as Asst. Secretary of the Air Force for Manpower and Reserve Affairs.

Maj. Gen. Guy H. Goddard has been named Dir. of Civil Engineering, Office of Dep. Chief of Staff (Programs and Resources), succeeding **Maj. Gen. Robert H. Curtin**, who retired April 30.

The following assignments have been made in the Air Force Logistics Command (AFLC):

Lt. Gen. Jack G. Merrell, Commander, Air Force Logistics Command, with promotion to rank of general; **Brig. Gen. Robert A. Berman**, Asst. Dep. Chief of Staff (Maintenance Engineering), AFLC Hq.; **Brig. Gen. John French**, Dep. Chief of Staff (Comptroller), AFLC Hq.; **Col. Lester T. David**, Dir. of Operations Systems, Advanced Logistics Center, Wright-Patterson AFB, Ohio; **Col. Rufus H. Nowell Jr.**, Chief, Aircraft and Engine Procurement Div., Oklahoma City Air Materiel Area, Tinker AFB, Okla.; **Col. Joseph E. Stiles**, Dir. of Advanced Systems, Advanced Logistics Systems Center, Wright-Patterson AFB, Ohio; and **Col. John R. Gibbons**, Dir. of Procurement and Production, Oklahoma City Air Materiel Area, Tinker AFB, Okla.

The following assignments have been made in the Air Force Systems Command (AFSC):

Col. Franklin K. Boosembark, Chief, Range Contract Office, Air Force Western Test Range, Vandenberg AFB, Calif.; **Col. Robert P. Daly**, Dep. for Development Planning, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. James H. Hall**, Dep., Systems Engineering Minuteman, Space and Missile Systems Organization, Norton AFB, Calif.; **Col. Gerald K. Hendricks**, Chief, Advance Programs F–111, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; and **Col. Joseph W. Rogers**, Asst. Test Dir., Air Force Flight Test Center, Edwards AFB, Calif.

Project Transition
A Path to a Productive Career

Frank M. McKernan

In April 1967, in his Manpower Report to Congress, President Johnson stated, "We must make military service a path to productive careers." He then requested the Secretary of Defense to establish a program for servicemen "to make available, to the maximum extent possible, in-service training and educational opportunities that will increase their chances for employment in civilian life."

Project Transition is the program set up by DOD with the cooperation of American industry and labor, and other Federal agencies to take care of this problem.

Each year more than 750,000 enlisted men and women return to civilian life from the Military Services. Many of these young men and women return to former civilian employment or go to college. However, many do not have jobs or college plans, or were unable to obtain a civilian related skill while serving in infantry, artillery, armor, or other combat or combat support duties. These people are the ones who need help in finding gainful employment.

Project Transition, although established by DOD, is not solely a Defense Department program; it is a cooperative effort with the private sector of our economy. It needs the active participation of business, industry and labor to make it work.

Basically Project Transition works like this: The Military Services will counsel the men during their last six months in service, and will make them available for training as needed. On the private industry, labor union, or local government side of the program is the actual training and hiring of men who are soon to be veterans.

For their part, the Military Services provide a pool of manpower that has several superior attributes. The veteran is older (average age of 22 years) and more mature than recent high school graduates. He is accustomed to accepting responsibility and has learned the benefits of discipline. He has been proved trainable. The veteran is mobile; he is usually willing and able to travel to a new home for employment. He is in good physical condition, unless he is one of the few who has suffered handicapping war injury. And, most important to a civilian employer, he has finished his active military obligation.

Under the Transition program, counselors at 205 posts and bases will interview enlisted personnel about six months prior to their separations from service to determine their aptitudes, interests and future prospects. To assist them the counselors have the results of Service-administered tests, Service records, notices of job opportunities and skill requirements. Counselors receive these notices of job opportunities and lists of skill shortages throughout the country from the U.S. Employment Service (USES) and from local, regional and nation-wide companies.

Frank M. McKernan is Director of Project Transition in the Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs). He was educated at the University of Cincinati, University of Wisconsin and the Graduate Institute of International Studies, Geneva.

At the minimum, counselors will assist men with saleable civilian skills in preparing resumes and in locating jobs. Under a full Project Transition program, the Services make the men, who need civilian skills, available for training by industry, trade associations, labor unions, or local governments, Manpower Development and Training Act (MDTA) courses, or within existing military training programs. The Services continue to shoulder all the costs usually associated with employment and personal maintenance—pay, food and housing. Many local bases will also transport men reasonable distances to established industrial training facilities, or to public or private vocational schools. In some instances, the local military base may be able to provide classrooms right on base.

In certain cases the Services will use vacancies in their own courses to teach civilian-related skills, such as data processing, to men in Project Transition, or utilize the on-the-job training facilities of the base engineer, communications, or utilities shops. Correspondence courses of the Services and the U.S. Armed Forces Institute, and group study classes are already being used to fill gaps in Transition trainees' educational backgrounds (especially in bringing them up to the equivalency of high school completion), or to teach collateral skills, such as arithmetic or geometry, to those men already skilled in vocations.

So far, with pilot program experience behind them, the Transition staff has found warm reception to the program by both industry and the men in the Services. As the word gets out, more companies, businesses, associations, labor unions and local government agencies are requesting information on how to start Transition training programs. Since the program was inaugurated nation-wide in January 1968, industry is already supporting training for such areas as service station managers, TV servicemen, automobile mechanics, heavy equipment operators, office machine servicemen, data processing equipment servicemen, marine pipefitters, and computer programmers.

Transition training courses can be established under the MDTA, through the cooperation of the Department of Labor and the U.S. Office of Education. These MDTA courses would conform to state educational criteria and would be administered by appropriate state agencies, but would require no state matching funds. DOD desires to use this training route at military installations where industry cannot provide training in order to balance out training opportunities.

The first five MDTA courses were established in Louisville, Ky., in the Fort Knox pilot program. Four of these courses (small appliance repair, welding, industrial electricity and automobile mechanics) are taught in the local school system's vocational education facilities; automatic data processing is operated by a private school.

Prospective employers interested in hiring veterans can tap the Project Transition manpower pool through their local U.S. Employment Service offices and through the Transition counseling program. While the DOD still has a policy which prohibits direct recruiting on a military base, Transition does afford companies an opportunity to make their needs known by furnishing information to the counselors.

Business, associations, labor unions, or local governments can participate in Project Transition under three plans. The first involves actual job training by industry or Government for vacant jobs. Under this plan, the company, association, union, or local government would furnish everything needed for training—materials, equipment, instructional program and instructor. The products of this program, trained under the standards of the company, are then available for employment with that company. Under this plan, training opportunities are opened to many deserving servicemen, and in turn, with some venture in funds, a company obtains valuable additions to its work force, trained under its own program.

Under the second plan, the company, association, union, or local government notifies the Defense Department of training opportunities for servicemen after their separation. Information about training opportunities would be circulated to Transition project officers at the 205 participating military installations for use in counseling. This plan would be appropriate when the training is not of the type that can be given while the man is in service, or when the training facilities are not located near a base, or when the man has too little active duty time remaining to complete the instruction.

The third plan involves making available to industry men who are already skilled as a result of either military or prior civilian experience. While the first plan, complete training of the unskilled, is the prime program, the Defense Department recognizes that there are many men whose skills can be used immediately by industry. Through counseling, the Department tries to help skilled servicemen find immediate employment commensurate with their skills and potential.

Proposals for Transition training programs may be forwarded to the Transition staff in Washington, and should contain the following information:

- Nomination for locations of training near military bases.
- Facilities where training would actually be conducted—on the military installation, at a plant site, in a training school, or a combination of places.
- Courses proposed.
- Length of courses—hours and weeks, with a basis of four hours instruction per day, five days a week.
- Methods of instruction.
- Buildings or facilities needed, if on a base or post.
- General summmary of course content.
- Jobs to which courses lead and general salary range.
- Selection instructions for counselors to use when screening applications for the courses. This would include company employment standards or general employment policies. Of course, employment and training must be open on an equal opportunity basis with respect to race, creed, or religion.
- Number of trainees per class.
- Locations where jobs will be available.
- Any other information which will amplify the proposal.

Proposals or other queries about Project Transition should be addressed to: Director, Project Transition, Office of Assistant Secretary of Defense (Manpower and Reserve Affairs), The Pentagon, Washington, D. C. 20301.

Containerization Office Established at MTMTS

A new office has been established within the Military Traffic Management and Terminal Service (MTMTS) to serve as a coordinating point with DOD, single manager transportation agencies, industry and other agencies having an interest in containerization.

MTMTS' Office of Project Manager for Containerization will be headed by Lieutenant Colonel C. R. Breining Jr., USA. He will be assisted by John Warren, an experienced transportation official, who was formerly assigned to the Water Export Control Division of MTMTS Freight Traffic Directorate.

Uniform Quality Levels Tightened by DSA

The Defense Supply Agency has announced a tightening of the acceptable quality levels for procurement of Class A military uniform items, and an increase in the inspection levels used for sampling inspections.

As a result, the contractor and the Government will be looking at a larger number of sample units to determine acceptability of lots offered for purchase. Quality standards will also be sharpened.

The change will apply to all future procurements of such uniform items as dress coats, trousers, overcoats, caps, Navy jumpers, and raincoats.

U.S. Army Munitions Command Continues Emphasis on RDT&E

G. F. Chesnov

At the time of the Army reorganization of command structure in August 1962, the U.S. Army Munitions Command was established as one of the seven major subordinate commands of the Army Materiel Command (AMC).

The Munitions Command, with headquarters at Picatinny Arsenal, Dover, N.J., is one of the most complex of all the AMC subordinate commands and activities by virtue of size and diversification of programs and commodities. Its mission responsibility of integrated management for the life cycle of munitions encompasses research, exploratory development, commodity development, design and engineering, procurement, production, supply and maintenance, and disposal. The commodities for which the command is responsible include nuclear and non-nuclear ammunition, rocket and missile warhead sections, chemical and biological materiel, pyrotechnics, and propellant actuated devices.

The mission is carried out through five major agencies, four of which (called commodity centers) are Edgewood Arsenal, Edgewood, Md.; Fort Detrick, Frederick, Md.; Frankford Arsenal, Philadelphia, Pa.; and Picatinny Arsenal at Dover, N.J. The fifth organization, the Ammunition Procurement and Supply Agency, manages the bulk of commodity manufacturing and loading plants and is the national inventory control point and the maintenance management center for the command. The mid-management responsibility for the overall commodity management program resides within the headquarters of the Munitions Command on the site of Picatinny Arsenal.

Planning for the successful accomplishment of the U.S. Army Munitions Command program is essentially no different from that of industry. Although the success of industry in the civilian consumer market is measured simply by profit, the process of profit making is far from simple, as many insolvents have learned to their sorrow. In spite of the unexpected "bad breaks" imposed by unpredictable political, economic and social instabilities and fluctuations in our free enterprise system, industry has learned that continued emphasis on planning is essential to staying on top.

Planning in the Munitions Command involves such factors as market assessment and stimulation, research for product improvement and innovation, engineering, development, product evaluation, production and distribution. The criterion for measuring its success cannot be financial gain. It is, rather, the ultimate strength of the Army's stockpile of weapons and firepower. Because the superiority of this stockpile contributes immeasurably to the nation's security, the state of bankruptcy may not be tolerated. Continued emphasis on research, development, test and evaluation (RDT&E) planning is indeed mandatory in the munitions business.

The Backbone of Weapons RDT&E Effort

The two most significant categories of effort in the RDT&E program are research and exploratory development. It is through the careful management planning of these programs that the U.S. taxpayer's defense and security are assured. Together, the research and exploratory development programs constitute the technological base for advanced weapon systems designs, designs which are optimized for performance under the most adverse and complex battlefield conditions of today, and of those postulated for the future. The fruit of these programs provides the understanding and technology for the synthesis of better materials, components, and advanced concepts which lead to systems with greater reliability and effectiveness, greater ease and safety of employment, and which require minimal maintenance in the field.

About the Author—

G. F. Chesnov is a physical scientist serving with the Research Division of the Research, Development and Engineering Directorate at Army Munitions Command Headquarters.

Policy—Management's Frame of Reference

As in most large and complex research and development organizations, the organization of the Army Munitions Command consists of managers with wide ranging ideas on how to plan, conduct and measure work. While such diversity is healthy and is to be encouraged, it may also, if unchanneled, degrade the productivity of research and exploratory development.

It was not too long ago that the term "research" covered the complete spectrum of scientific and engineering investigation, from study of interatomic forces to the breadboarding of prototype fuzes. Although attempts at semantic differentiation were made, the concepts of management appeared the same for the entire spectrum. Consequently there existed classic examples of applied engineering research being protected within ivory tower environments, and fundamental or basic research being placed under development type controls, depending on the background of the laboratory director.

Since a distinction is now made between research and exploratory development, policy for these quite separate activities must be differentiated. Such policy must reflect an

understanding of research and exploratory development. It must also provide a frame of reference wherein management may encourage the successful conduct of fruitful effort within each of the two programs.

Organization for Mid-Management

Based on the premise that its research and exploratory development program needs to be nourished by special management concepts and managed by scientist-managers, the Munitions Command organized the Research Division within the Research, Development and Engineering Directorate of its headquarters. The division is charged with the formulation of policies, practices and technical programs of research and exploratory development and, thereby, will:

- Insure and encourage the pursuit of fundamental knowledge in the sciences to achieve a balanced spectrum of technical effort and disciplines of relevance to the command's basic missions and interests.
- Insure that the exploratory development program is directed toward solution of specific military problems, and that the necessary work is done, from time-oriented research to advanced breadboard hardware, to provide a firm technical foundation for the engineering development of end items in the nuclear, non-nuclear, chemical and biological areas.

The Research Division is staffed with scientists and engineers having bench experience, an appreciation for the trials of the laboratory, and an understanding of the problems of administration. It is their job to plan, establish and implement the policies that will produce good work.

Policy Planning for Research

In Army Regulation 705–5, research is considered to constitute all effort directed toward increased knowledge of natural phenomena and environment, and efforts directed toward solving problems in the physical, behavioral and social sciences. These problems may not necessarily have direct military application, but their solutions will provide the basic understanding required to solve problems of military importance.

Research, being indefensible on the basis of immediate payoff, requires a policy accepting it on its own terms, or at least consistent with its definition. An important function of research policy is to protect the researcher from the type of technical manager whose objective is to legislate and program scientific discovery. On the other hand such policy should call for quality researchers, quality output, and a sincere attempt to communicate knowledge and understanding in support of the military mission.

The Munitions Command research program, as indicated by Figure 1, constitutes effort in the defense research sciences, including work in the functional areas (in direct support of commodity materiel), *i.e.*, research in explosives, propellants, pyrotechnics, and the life sciences. This research effort, on which more than $5 million was spent in FY 1967, is apportioned among the Munitions Command laboratories. It is in the interest of furthering these programs that the agencies will plan within the following "frame of reference:"

- The nature of effort is geared to understanding basic or fundamental phenomena, related to command mission and/or materiel when possible.
- Categorical forecasts of task or project completion and positive results are difficult, if not impossible to make, although certain logical experiments/analyses may be scheduled with considerable tolerance and management flexibility.
- Costs of completing proposed work may not be forecast accurately, since research is identified with "level of effort" or required manhours.
- The principal investigator proposing to do the research must be a qualified research scientist with demonstrated ability.
- Where applicable, every effort must be made to convey needed information to those in exploratory development and commodity development areas.

The Balanced Research Program.

The term "balanced research program," as it applies to the spectrum of effort in the RDT&E program of any commodity command, represents management's best judgment on the distribution of resources among the disciplines. Because this distribution is determined subjectively, it is controversial and always open to challenge, and it requires continual justification. A commodity command cannot establish a research program as an end in itself. This is a luxury only educational institutions may afford, whose principal mission is the scientific development of student and faculty via philanthropies and grants. The strength of a research program in the Munitions Command is determined primarily by its ability to serve the information needs of its commodities. This philosophy dictates that the distribution of resources in the research program must be biased, *e.g.*, that there be twice as many physicists as chemists, and half as many mathematicians as metallurgists within the total budget.

The retention of research scientists in a commodity command is based also on the need for having an advisory staff available to the engineering staff. This, too, may influence the distribution of research effort.

The advent of sophisticated enemy munitions systems, and the progressively increasing requirements of our own, have clearly indicated greater demands on weapon materials for

RESEARCH PROGRAM

DEFENSE RESEARCH SCIENCES	PARTICIPATING MUNITIONS COMMAND AGENCIES
Physics	Frankford and Picatinny Arsenals
Chemistry	Edgewood, Frankford and Picatinny Arsenals
Mathematics	Frankford and Picatinny Arsenals
Quantum Electronics	Frankford and Picatinny Arsenals
Mechanics	Frankford and Picatinny Arsenals
Materials	Frankford and Picatinny Arsenals
Explosives and Pyrotechnics	Picatinny Arsenal
Gun Propellants	Frankford and Picatinny Arsenals
Life Sciences—Chemical	Edgewood Arsenal
Life Sciences—Biological	Fort Detrick

Figure 1.

the future. These materials must perform effectively as intended, and survive unprecedented battlefield conditions and environments. For this reason the job of long range planning is the continuous appraisal of the postulated threat, the determination of associated knowledge gaps in our technology, and the ultimate balance needed in the research program. An excerpt from the Munitions Command regulation, concerning long range technical planning, states: "The long range plan for basic research will usually relate only to the general areas in which the research will be performed. It will show new directions in which the laboratory is expecting to move or old directions to be decreased or eliminated. It will serve as a guide to the types of new personnel that will be required and as a guide to training of current employees."

One might argue that once a government in-house laboratory research program is achieved, it is rigidly fixed and not subject to change because:

- Federal Civil Service regulations on personnel policies and practices limit technical management's response time to changing requirements.
- Most highly qualified research investigators have a high degree of specialized interest in comparatively narrow fields, and may not want, or be able, to change readily to related or other fields.

Without appropriate controls, it is conceivable that a research program, due to preferences of the scientific staff, may tend to be self-perpetuating. Management does, however, have four strong measures to prevent this from happening. These are:

- Scientist exchange programs.
- Retraining and post-doctoral educational programs.
- Industrial and academic institutional support.
- Selective hiring into positions which are vacated by normal attrition.

Unless planning has been poor, there is seldom a need for rapid change in the research program. In general, the use of the four approaches mentioned has proved adequate to accommodate changing needs, as determined by long range planning.

Planning for Training.

Recognizing the need for continual stimulation of planning for training programs, Major General Floyd A. Hansen, former Commanding General of the U.S. Army Munitions Command, in a letter to his research and development agencies, dated Jan. 13, 1967, stated. "It is my desire that each installation of the Munitions Command establish a positive program for the continued education of scientific and engineering personnel, directed toward updating the knowledge of scientists and engineers to keep them abreast of scientific and technological advances." The guidance set forth by the Commanding General included enrollment at local colleges and universities; participation in the National Academy of Sciences Post-Doctoral Research Associateship Program for both junior and senior post-doctorals; exchange of scientific and engineering personnel with those engaged in research and development activities at other DOD laboratories; and scientist exchange assignments with foreign laboratories. The request also included an assessment of the current status of the scientific and engineering training and development programs of the command's laboratories, and the development of a "planned and time-phased program, over a period of two to five years for accomplishment of such needed training."

In addition to contracts and grants to assist government laboratories in maintaining a dynamic program, the Defense Department set a pace for its agencies with a plan called Project THEMIS. This plan is intended to strengthen the scientific and engineering capabilities of the nation's higher academic institutions and, thereby, enhance the research capability relating to the national defense. For those academic institutions meeting the eligibility criteria for participation in the project, research in these institutions is supported on a program basis, rather than through small contracts and grants. Project THEMIS has the effect of complementing the in-house government research capability through mutual university-defense laboratory cooperative efforts and greater technical communications. This program is an example of thorough policy planning with regard to our nation's scientific resources.

Facilities and Equipment Planning.

One of the more difficult aspects of RDT&E planning is providing a basis for acquiring facilities and equipment to satisfy program needs. Sharply rising costs have made it necessary to screen requests very carefully for long range need and payoff. Because of the limited defense budget for capital expenditures, the Army simply cannot afford a nuclear reactor in every backyard. In recent years, instrumentation technology has improved so rapidly that expensive equipment very quickly becomes outmoded and obsolete. While any competent scientist will strive to improve the accuracy or speed of his measurements, management must keep things in proper perspective. Requirements submitted for new equipment and facilities must be entertained openmindedly, but must be soberly evaluated against such considerations as the adequacy of existing

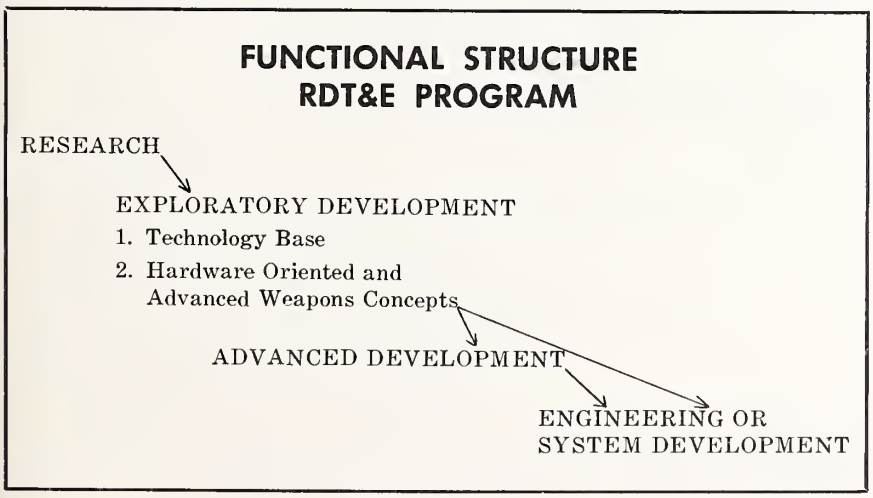


Figure 2.

equipment, the cost of modernization versus cost of replacement, and the proximity, availability and cost of borrowing equipment from other laboratories. The most important consideration, as mentioned previously, is whether or not the equipment fulfills a long range need.

Exploratory Development Policy and Planning

The Munitions Command exploratory development program, in contrast to the research program, is geared toward providing solutions to specific military problems, as related to weapon materials and concepts. That part of the exploratory development effort, which is expected to culminate in improvements in the state of the art of materials, is considered "technological base" activity. It is characterized by work in such projects as rocket and missile propellants, explosives, metals research for Army materiel, medical defense aspects of chemical agents, lubricants, friction and wear, and applied research in radio-frequency effects on warhead sections and weapon systems.

The exploratory development, which is expected to culminate in the feasibility of new munitions concepts, is the "hardware-oriented and advanced weapons concepts" activity. Typical of this activity is work in such areas as artillery ammunition, propellant-actuated devices, non-nuclear warheads for guided missiles, fuze supporting research, and chemical weapons systems technology.

Under the existing Army research and development management system, exploratory development is a part of the concept formulation phase of the research and development cycle, wherein the promise or probability of meeting full-scale development objectives is determined, namely, operational, cost and schedule objectives (see Figure 2). There are certain prerequisites to entering into engineering or operational system development. They include the assurance that the technology needed is available, that the best technical approaches have been selected, and that cost and schedule estimates are credible and acceptable. Clearly, exploratory development efforts should lead to real and definable objectives. Therefore, the management policy and tools for insuring productivity in this work must be different from those governing research. The fact that scientists work jointly with engineers in such programs provides no license for management to apply research policies and criteria in the conduct of exploratory development.

Several industrial management systems, still used today, have been attempted for exploratory development (applied research). They have the common objective of forecasting milestones and expenditures, and are designed for periodic monitoring of progress in accordance with anticipated schedules. The premise on which such planning is based is that engineers and scientists normally work in accordance with a preconceived plan; if a system is devised with sufficient flexibility to permit change in direction, it can be an invaluable tool to program management of exploratory development activities.

The gamut of criticism, regarding the desirability of such industrial management systems, is as diverse as the professions involved in the business of research and development. Attitudes in the research and development community range from partial acceptance to complete rejection.

Policy on QMDO Planning.

Department of the Army policy requires the assurance that exploratory development activity and programs support operational objectives and the Qualitative Materiel Development Objective (QMDO). The latter is an approved statement of a Department of the Army military need for developing new materiel. The *modus operandi* for the accomplishment of this is the QMDO plan which has been adopted by all of the Army Materiel Command agencies and laboratories, including the Army Munitions Command. It differs from the majority of industrial management systems in not being a time-phased schedule of milestones. However, it is a useful mechanism to assure that exploratory development effort, towards an approved objective or objectives, is identified and defined, and that costs for materiel, equipment and manpower are properly estimated and budgeted.

The nucleus of such a plan is the QMDO Plan Network Structure (see Figure 3). The network is a chart which outlines and identifies the materiel objectives, and delineates the weapon concepts or materiel concepts thought to be attainable within the estimated time frame for accomplishing the objectives. In addition, the network illustrates, for each concept, the technical approaches to be pursued and concomitant major barrier problems to be solved in order to achieve the objectives. Each such major barrier problem, representing an identified technical information

(*Continued on Inside Back Cover*)

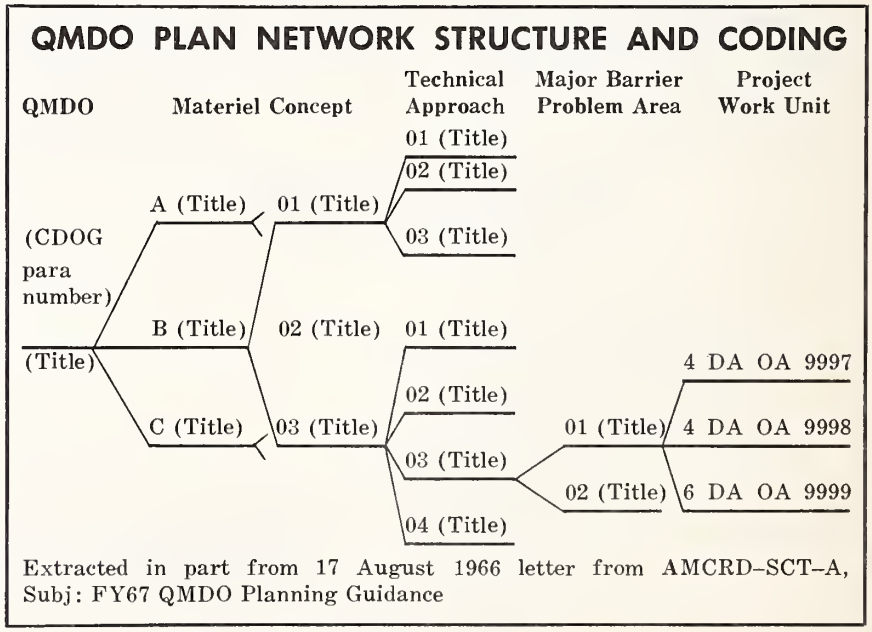


Figure 3.

Cost Information Reports Progress and Plans

Colonel Herbert Waldman, USAF

In April 1966, after more than a year of internal development and many discussions with industry, the Defense Department embarked on a new program, the Cost Information Reports (CIR), designed to improve the collection of contract cost data which are used to develop independent DOD cost estimates for a variety of needs. Over 250 separate companies were contacted for comments on the CIR instructions, and many meetings were held under the auspices of the newly formed Council of Defense and Space Industry Associations (CODSIA) to resolve incipient issues over the proposed procedures.

Concurrently with these steps, new manpower increases were authorized for an expansion of the force of cost analysis specialists who would be assigned to the Military Departments to work on these problems. The organization of cost analysis groups has been a key feature in achieving a usable capability.

The Cost Information Reports were designed to meet cost data needs of all the Military Departments, by using one set of uniform procedures which would obviate the need for each Department to create what could be duplicate or overlapping requirements for cost information. As a part of these procedures, the Office of the Secretary of Defense required the submission of a CIR Data Plan for approval, before a recurring reporting of data might be installed as a requirement in a contract.

CIR development and evolution are governed by the same basic precepts today as were first described by Assistant Secretary of Defense (Comptroller) Robert N. Anthony, during the Advanced Planning Briefings for Industry given nation-wide during the Spring of 1966 (*Defense Industry Bulletin*, April 1966, page 19), which are to:

- **Standardize and control DOD data demands on contractors and in-house facilities. The intent, pure and simple, is to reduce markedly the volume, variety and number of management-type reports which DOD demands of industry.**
- **Minimize pressures to change effective contractor management accounting systems, but insure that data are credible and timely.**
- **Recognize that needs for data differ at various management levels. In particular, limit the flow of data to top DOD management to that needed for the carrying out of top management responsibilities.**
- **Leave room for innovation and progress and, hence, minimize the mandatory features.**
- **Recognize the paramount interest of the first-line manager, *i.e.*, the project manager.**

Work is continuing within DOD to evolve methods for extending CIR coverage to systems which are not in the aerospace category.

As indicated in Figure 1, proposals are being reviewed for expansion in coverage to include ground electronics and ordnance systems. Eventually consideration will also be given to the need for historical cost data for ships and armor systems. Before any such requirements may be officially approved for general use, approval of the Bureau of the Budget under the Federal Reports Act (5 USC 139) will, of course, be obtained.

In undertaking this approach the objectives of the Office of the Secretary of Defense (OSD) were to obtain better cost data with which the internal management of DOD resources could be improved. Underlying this need was a recognized de-

STATUS OF CIR IMPLEMENTATION
Department of Defense
April 30, 1968

DEPARTMENT	DATA PLANS * RECEIVED	APPROVED	UNDER REVIEW	REPORTING IN PROCESS
ARMY PROGRAMS	12	10	3	7 (13 CONTRACTS)
NAVY PROGRAMS	20	20	-	5 (8 CONTRACTS)
AIR FORCE PROGRAMS	17	8	12	7 (14 CONTRACTS)
TOTALS	49	38	15	19 (35 CONTRACTS)
WEAPON SYSTEM FAMILY				
AIRCRAFT	25	21	4	12
MISSILES	16	14	6	3
SPACE SYSTEMS / LAUNCH VEHICLES	6	3	4	4
OTHER **	2	-	1	-

* THE NUMBER OF REVISED DATA PLANS SUBMITTED BY THE MILITARY DEPARTMENTS IS NOT INCLUDED IN THESE FIGURES

** GROUND ELECTRONICS AND ORDNANCE SYSTEMS PROPOSED FOR COVERAGE

Figure 1.

ficiency in DOD's independent cost estimating capability. In many situations we have been dependent on cost estimates provided by contractors, and bidders, lacking the capability within DOD to judge the accuracy and reasonableness of the estimates submitted. The development of improved techniques and better cost estimates was then and has continued to be hampered by the lack of an adequate supply of suitably structured, valid cost data about the major weapon system programs. The major uses, which such data can support, were originally described as objectives of the CIR and remain as our working objectives today. Included are the need to:

- **Provide cost information for weapon/support system cost-effectiveness studies.**
- **Provide cost information in support of program change request (PCR) estimates.**
- **Develop cost information in support of procurement activities.**

Today, two years after the system was approved for use following a formal hearing at the Bureau of the Budget, the Cost Information Reports are well on their way to accomplishing the uses for which the system was developed.

As shown in Figure 1, OSD has already received Data Plans for 49 different programs and approved recurring data collection on 38. Data Plans for 15 programs are still under review in the OSD Data Plan Review Committee; some of these are proposals for the modification of Data Plans which have been previously approved, *e.g.*, all of the Army Data Plans still under review are proposals for modifying a Data Plan on a program already approved, and three of the Air Force Data Plans still under review are in the same category. Not shown directly in Figure 1 is the fact that two Data Plans have been disapproved.

Data collection has begun slowly and is now accelerating. Reporting is in process on 19 programs, with CIR data being received from 35 different contractors at the present time. Within the next 6 months, CIR coverage is expected to increase to 30 programs involving 56 contracts.

The highest frequency requirement for any CIR report is quarterly, which is authorized for one form (the Progress Curve Report) among the set of five CIR forms. Typical DOD weapon system programs included among those for which Data Plans have been approved to date are the A–6, UH–1B and D, and C–5A aircraft programs; the Phoenix, Chaparral and SRAM missile systems; and program 949 in the space category.

To insure that selectivity is practiced in identifying cost data to be collected, OSD has installed a regulatory mechanism to assure that the data requirement, which a project manager proposes to install in the contracts for his project, will be screened by a high level review group advising the Assistant Secretary of Defense (Comptroller) in these matters. Under this procedure, the recurring cost data requirements to be incorporated within a given contract, or series of contracts, for a given weapon or support system are submitted by the appropriate Military Department to the Office of the Assistant Secretary of Defense (Comptroller) for review. This is shown in Block 1 of Figure 2. In the most frequent cases, the procedure has followed Blocks 2, 3, 4, 5 and 6. Where special conditions exist, one or more alternative paths shown in the chart can be followed. Modifications to submitted Data Plans have been required in the past because of uncertainty about work breakdown structures (WBS) and cost data needs in the Data Plans being submitted.

Understandably this situation may result within the environment which exists when a Military Department initiates the Data Plan proposing specific CIR coverage. DOD Instruction 7041.2 provides that, "For systems proposed for engineering or operational systems development, the WBS elements recommended for CIR coverage will be submitted in a Cost Data Plan together with the Technical Development Plan to the Director, Defense Research and Engineering. . . ." At that time in the acquisition cycle, the work breakdown structure is highly flexible and considerable room will exist for interpretation. To accommodate the examination of the Data Plan proposal on this basis, the Data Plan review procedures were designed to recognize the desirability of full discussion as to the approach to be taken in identifying cost data requirements.

In all cases, although not shown in any block except 4A, representatives of the Military Departments meet with the CIR Data Review Committee, which is comprised of representatives of the Assistant Secretaries of Defense (Comptroller), (Installation and Logistics) and (Systems

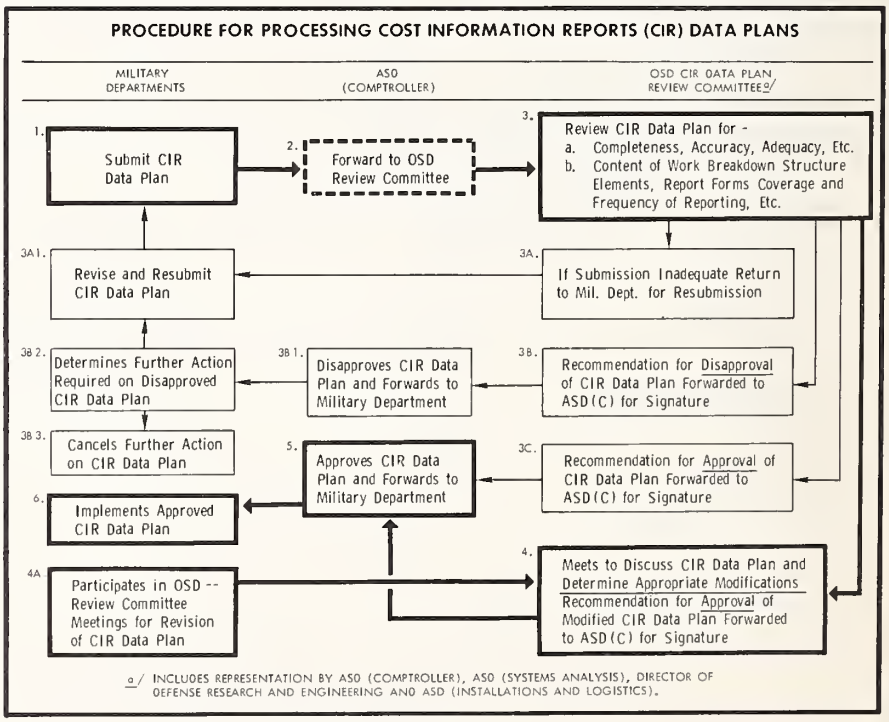


Figure 2.

Analysis), and the Director of Defense Research and Engineering, to review the content and merits of each specific proposal under consideration. During the committee review, the proposed cost data requirements are examined for adherence to OSD requirements and appropriateness, and utility of data in the degree of detail specified. Any additional or unique data requirements have to be fully justified before approval is granted. This procedure is insurance against undesirable proliferation.

The operation of these procedures for two years has seen the fulfillment of commitments which were publicly made to industry at large that DOD management was embarking on a centrally regulated program to obtain information from contractors. On their part, contractors have been most cooperative in seeking to meet DOD needs. In cases where difficulty has appeared to exist, discussions among the technicians, concerned with the problems of reporting and acquiring the data, have successfully provided a satisfactory solution. Such procedures will continue to be used by those of us who are making the effort to keep needed information flowing in an effective channel. Hopefully, this cooperative approach will be continued, so that new techniques in cost analysis and cost research can be realized with the help of the data which are becoming available through the CIR program.

Colonel Herbert Waldman, USAF, is Director of Assets Management Systems in the Office of the Assistant Secretary of Defense (Comptroller). He holds a master's degree in business administration from the University of Michigan as well as a masters degree in international affairs from George Washington University.

Cost Contractor's Liability

(*Continued from Page 20*)

judicial avenue of relief is cumbersome and expensive.[34]

The parties should be afforded an opportunity to negotiate in advance the full measure of damages assessable against the contractor in event of breach. The results of this negotiation, contractually recorded, would protect the contractor from unconscionable loss; and it would relieve the Government from the onerous task of seeking judicial resolution of damages. A balancing of interests would be achieved.

Because of the difficulty and uncertainty of establishing actual damages, this approach would be justified.[35] Further, it would be legally enforceable so long as the agreed amount is not so high as to constitute a penalty.[36]

In essence, a liquidated damages clause is suggested. More euphemistically, and perhaps more accurately, it could be labeled a "Limitation of Contractor Obligation" clause. As a by-product, the suggested clause would effectively dispel any lingering doubt as to the contractor's liability for breach of contract damages.

[34] *Kolker v. United States, 40 F. Supp. 972 (D.C. Md. 1941).* But see *Cannon Constr. Co. v. United States, 319 F. 2d 173 (Ct. Cl. 1963) which endorses* bilateral *administrative settlements of unliquidated claims based on breach of contract.*

[35] *United States v. Walkof, 144 F. 2d 75 (2d Cir. 1944).*

[36] *Steffen v. United States, 213 F. 2d 266 (6th Cir. 1954).*

ARMED SERVICES PROCUREMENT REGULATION

(1963 Edition Including All Revisions Up To Date)

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SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

	1966 I	II	III	IV	1967 I	II	III	Oct	Nov	Dec	IV	1968 Jan	Feb	Mar	I
I. *Military Prime Contract Awards*															
Aircraft	$1,945	$2,989	$2,696	$2,262	$2,102	$3,049	$2,513	$1,249	$ 578	$ 805	$ 2,632	$ 442	$ 530	$ 574	1,546
Missile & Space Systems	1,040	987	1,314	861	1,230	1,166	1,580	323	429	316	1,068	348	470	393	1,211
Ships	355	491	876	239	679	407	417	153	147	110	410	109	79	236	424
Weapons & Ammunition	555	1,486	692	940	818	1,769	1,104	454	451	439	1,344	226	416	383	1,025
Electronic & Communications Equip.	918	1,574	666	915	971	1,848	816	272	247	305	824	359	264	248	871
Other Hard Goods	843	1,842	660	1,029	915	1,564	785	252	153	248	653	246	348	306	900
Soft Goods	709	922	1,078	989	638	652	1,056	175	118	198	491	437	140	202	779
Construction	207	392	198	150	232	626	232	56	44	113	213	61	53	67	181
All Other	1,406	1,963	2,356	1,639	1,605	1,987	2,335	522	486	649	1,657	457	470	534	1,461
Total (Excl. Work Outside U.S.)	7,978	12,646	10,536	9,024	9,190	13,068	10,838	3,456	2,653	3,183	9,292	2,685	2,770	2,943	8,398
Total Seasonally Adjusted	8,703	10,144	10,716	10,149	10,171	10,667	10,961	3,665(R)	3,308	3,479	10,413	2,887	3,445	3,124	9,456
Work Outside U.S.	521	1,195	856	672	453	834	891	193	117	145	455	288	139	134	561
II. *Gross Obligations Incurred*															
Operations	8,326	9,604	10,426	9,702	10,229	11,435	11,224	3,776	3,374	3,663	10,812	3,798	3,435		
Procurement	4,374	8,539	4,368	5,276	5,113	8,948	6,154	2,699	1,717	1,876	6,292	1,784	1,865		
Other	2,429	3,470	3,453	2,230	2,519	3,510	3,420	860	665	669	2,194	863	792		
Total	15,129	21,613	19,247	17,208	17,861	23,893	20,798	7,335	5,755	6,208	19,298	6,445	6,092		
III. *Gross Unpaid Obligations Outstanding*															
Operations	3,828	3,777	4,792	5,024	4,644	4,513	5,267	5,270	5,050	5,150	5,150	5,127	5,127		
Procurement	18,023	22,119	22,736	23,173	22,780	25,248	24,925	25,423	24,982	24,856	24,856	24,197	24,024		
Other	5,625	5,942	8,026	7,253	6,996	7,506	7,971(R)	7,854	7,609	7,360	7,360	7,329	7,303		
Total	27,476	30,838	35,554	35,450	34,420	37,267	38,163(R)	38,547	37,641	37,366	37,366	36,653	36,454		
IV. *Net Expenditures*															
Operations	7,689	9,076	8,968	9,087	10,002	10,731	10,001	3,641	3,456	3,397	10,494	3,550	3,273		
Procurement	3,651	3,886	4,392	4,264	5,074	5,282	6,060	2,005	1,890	1,704	5,598	2,274	1,913		
Other	2,757	2,647	2,484	3,092	3,160	2,001	3,047	790	847	724	2,363	1,153	1,032		
Total	14,097	15,609	15,844	16,443	18,236	18,014	19,108	6,436	6,194	5,825	18,455	6,977	6,218		
V. *DOD Personal Compensation*															
Military	3,181	3,249	3,551	3,606	3,624	3,646	3,842	1,264	1,297	1,411	3,972	1,338	1,339		
Civilian	1,937	2,015	2,105	2,135	2,170	2,248	2,271	773	772	787	2,332	828	774	764(P)	2,366(P)
Total	5,118	5,264	5,656	5,741	5,794	5,894	6,113	2,037	2,069	2,198	6,304	2,116	2,113		
VI. *Outstanding Payments*															
Advance Payments	66	79	90	83	92	80	110				134				
Progress Payments	4,402	4,346	4,750	5,461	5,981	6,765	7,179				7,491				
Total	4,468	4,425	4,840	5,544	6,073	6,845	7,289				7,625				
VII. *Strength (Manpower)*															
Military	2,969	3,094	3,229	3,334	3,371	3,377	3,412	3,416	3,412	3,398	3,398	3,427	3,440		
Civilian	1,088	1,138	1,184	1,230	1,268	1,303	1,274	1,277	1,277	1,271	1,271	1,267	1,265	1,266(P)	

NA = Not Available
P = Preliminary
R = Revised

Note: Open spaces for Indicators other than No. VI indicate information not available at time of publication. Indicator No. VI information available only on a quarterly basis. Totals may not add due to rounding.

Directorate for Statistical Sevices
OASD (Comptroller)
April 29, 1968

DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of April 1968:

DEFENSE SUPPLY AGENCY

1—**J. P. Stevens & Co.**, New York, N.Y. $1,618,199. 536,000 yards of tropical wool cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1946.

2—**Alpha Industries**, Knoxville, Tenn. $1,054,500. 150,000 men's field coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1974.

—**J. P. Stevens & Co.**, New York, N.Y. $1,748,250. 450,000 linear yards of wool serge coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1970.

—**South Jersey Clothing Co.**, Minotola, N.J. $1,181,073. 54,730 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1803.

—**Humble Oil & Refining Co.**, Houston, Tex. $1,083,600. 240,000 barrels of automotive gasoline. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–0808 P002.

—**Humble Oil & Refining Co.**, Houston, Tex. $3,441,900. 800,000 barrels of diesel fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–0808.

—**Mobil Oil Corp.**, New York, N.Y. $2,027,970. 435,000 barrels of diesel fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–0818.

3—**U.S. Steel International**, Washington, D.C. $2,366,346. 27,449,843 lbs. of corrugated steel sheets. Defense Industrial Supply Center, Philadelphia, Pa. DSA 500–68–C–C271.

—**Delta Petroleum**, New Orleans, La. $1,559,304. 3,951,631 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va. DSA 640–68D–0048 P001.

5—**Burlington Industries**, New York, N.Y. $4,738,438. 3,098,904 white cotton bed sheets. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1992.

—**Pembroke, Inc.**, Egg Harbor, N.J. $1,483,081. 80,080 men's woll serge overcoats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2003.

10—**Lukens Steel Co.**, Coatesville, Pa. $1,530,900. Seven bow sonarspheres. Defense Industrial Supply Center, Philadelphia, Pa. DSA 500–69–C–C270.

11—**Trenton Textile Engineering & Mfg. Co.**, Trenton, N.J. $1,683,000. 300,000 nylon-coated twill ponchos. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2052.

—**Wilson Co.**, Centerville, Tenn. $1,366,315. 243,550 nylon-coated twill ponchos. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2053.

15—**Ojus Industries**, Miami, Fla. $1,869,812. 173,936 rolls of concertina tape. Defense Construction Supply Center, Columbus, Ohio. DSA 700–68–C–6638.

16—**Gulf States Asphalt Co.**, Columbus, Ohio. $1,355,023. 6,609,870 gallons of soil binder. Defense Construction Supply Center, Columbus, Ohio. DSA 700–68–D–0076–0007.

—**Borden Co.**, New York, N.Y. $1,735,360. 177,012 cases of canned milk. Defense Personnel Support Center, Philadelphia, Pa. DSA 130–8–C–29439.

—**Economy Mfg. Co.**, Searcy, Ark. $1,659,527. 182,306 plywood trunk lockers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–1159.

—**North American Packing Co.**, Boston, Mass. $1,595,472. 1,296,000 cans of ham hunks. Defense Personnel Support Center, Philadelphia, Pa. DSA 130–8–C–13447.

18—**Hess Oil & Chemical Corp.**, Perth Amboy, N.J. $1,783,169. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1473.

19—**Texaco, Inc.**, New York, N.Y. $3,252,670. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–1511.

23—**Joseph Pickard Sons Co.**, Philadelphia, Pa. $3,223,500. 15,000 bundles of landing mats. Defense Construction Supply Center, Columbus, Ohio. DSA 700–68–C–6936.

24—**Stauffer Chemical Co.**, New York, N.Y. $1,368,294. 325,898 gallons of aircraft turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–C–1907.

—**Martin Lane Co.**, Elizabeth, N.J. $1,120,672. 128,655 body armor vests. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–68–C–2159.

29—**Dowling Bag Co.**, Valdosta, Ga. $1,837,500. 8,750,000 polypropylene sandbags. Defense General Supply Center, Richmond, Va. DSA 400–68–C–5601.

—**Cavalier Bag Co.**, Lumberton, N.C. $2,249,500. 11,000,000 polypropylene sandbags. Defense General Supply Center, Richmond, Va. DSA 400–68–C–5600.

—**Kaiser Steel**, El Monte, Calif. $1,776,013. 8,373 bundles of landing mats. Defense Construction Supply Center, Columbus, Ohio. DSA 700–68–C–6994.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency—Contract number.

DEPARTMENT OF THE ARMY

1—**Federal Cartridge Corp.**, Minneapolis, Minn. $9,844,170. Production of ammunition and maintenance of the Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–36–038–AMC–01099 (A).

—**AVCO Corp.**, Stratford, Conn. $5,499,000. To establish a second production capability for T-53 helicopter engines. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–68–C–1767.

—**R.C.A.**, Moorestown, N.J. $4,892,931. A prototype and five production units of a mobile instrumentation radar system. White Sands Missile Range, N.M. DA–AD07–68–C–0015.

—**Sylvania Electric Products**, Williamsville, N.Y. $2,000,000. Reliability testing and de-bugging of helicopter radio sets. Buffalo, N.Y., Long Island, City, N.Y. and Dartmouth, Nova Scotia. Electronics Command, Fort Monmouth, N.J. DA–28–043–AMC–01943 (E).

—**General Instrument Corp.**, Chicopee, Mass. $1,113,750. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0246.

2—**Aberthaw Construction Co.**, Boston, Mass. $5,022,843. Construction of a three-story guidance laboratory, a two-story optics laboratory, and a shipping and receiving building at the NASA Electronics Research Center, Cambridge, Mass. New England Div., Corp of Engineers. DA–CA–33–68–C–9005.

—**Martin-Marietta**, Orlando, Fla. $3,560,339. Industrial engineering services in support of the Pershing 1A weapons system. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–0257.

—**Flanagen Shipping Corp.**, Port Arthur, Tex. $2,485,810. Stevedoring and related terminal services for a two-year period. Beaumont, Tex. Eastern Area, MTMTS, Brooklyn, N.Y. DA–HC21–68–C–0093.

—**Hughes Tool Co.**, Culver City, Calif. $2,426,584. Rotary wing blades for OH-6A helicopters. Aviation Materiel Command, St. Louis, Mo. DA–23–204–AMC–03697 (T).

—**Riddle Contracting Co.**, Salina, Kan. $1,564,604. Relocation of 18.4 miles of country roads in connection with the Perry Dam and Reservoir Project, Jefferson County, Kan. Engineer Dist., Kansas City, Mo. DA–CW41–68–C–0129.

—**Philco-Ford Corp.**, Newport Beach, Calif. $1,444,118. Continued development of the XM140, 30mm automatic gun for installation on UH-1-B helicopters. Army Arsenal, Rock Island, Ill. DA–AF05–67–C–0024.

—**Page Communications Engineers**, Washington, D.C. $1,366,475. Engineer, furnish and install communication-electronic subsystems equipment in the new EUCOM Command Center, Stuttgart, Germany and Washington, D.C. DA–AB07–68–C–0137.

—**Standard Dredging Corp.**, New Orleans, La. $1,081,688. Rental of dredging equipment in connection with the Mississippi River Channel Improvements Project. Shelby County and Dyer County, Tenn. Engineer Dist., Memphis, Tenn. DA–CW66–88–L–0089.

3—**Harrington & Richardson, Inc.**, Worcester, Mass. $1,826,016. 7.6mm gun barrels. Army Weapons Command, Rock Island, Ill. DA–AF–03–68–C–0055.

—**TRW, Inc.**, Redondo Beach, Calif. $1,000,000. Classified R&D. Electronics Command, Fort Monmouth, N.J.

—**U.S. Steel**, Pittsburgh, Pa. $2,422,265. Eight-inch projectile metal parts. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA–09–67–C–0279.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,352,789. AN/GRC-158 radio sets. Electronics Command, Fort Monmouth, N.J. DA–AB–07–68–C–0251.

—**Kilgore Corp.**, Toome, Tenn. $2,048,910. Parachute illuminating flares. Picatinny Arsenal, Dover, N.J. DA–AA–21–68–C–0839.

—**Troup Bros., Inc.**, Coral Gables, Fla. $1,049,866. Construction work on the Central and Southern Florida Project. Indiantown, Fla. Engineer Dist., Jacksonville, Fla. DA–CW–17–68–C–0064.

—**Martin-Marietta**, Orlando, Fla. $4,500,000. Ground support equipment for the Pershing missile. Army Missile Command, Huntsville, Ala. DA–AH–01–68–C–1628.

4—**KDI Corp.**, Cincinnati, Ohio. $1,331,200. Metal parts for fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0133.

5—**Maremont Corp.**, Saco, Maine. $3,774,154. 7.62mm machine guns with spare barrel and bipod assemblies. Army Weapons Command, Rock Island, Ill. DA–AF03–67–C–0087.

—**Hercules Engines**, Canton, Ohio. $1,671,596. Ten- and twenty-horsepower gasoline engines. Mobility Equipment Command, St. Louis, Mo. DA–23–195–AMC–00284 (T).

—**Union Carbide**, New York, N.Y. $3,165,525. Dry batteries for radio sets. Charlotte, N.C. DA–AB05–68–C–2379; $2,627,235. Dry batteries for radio sets. Charlotte, N.C. DA–AB05–68–C–2380. Electronics Command, Philadelphia, Pa.

—**Eisen Bros.**, Hoboken, N.J. $1,647,550. Metal parts for 40mm high explosive projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AG25–68–C–0723.

—**Raytheon Co.**, Lexington, Mass. $1,303,250. Metal parts for bomb fuzes. Bristol, Tenn. Army Procurement Agency, New York, N.Y. DA–AA09–68–C–0243.

8—**Pace Corp.**, Memphis, Tenn. $1,609,054. Surface flares. Camden and Russell, Ark. Picatinny Arsenal, Dover, N.J. DA–AA21–68–C–0497.

9—**Midvale-Heppenstall Co.**, Philadelphia, Pa. $2,325,600. Forging of alloy steel tubes

for 175mm guns. Watervliet Arsenal, Watervliet, N.Y. DA–AF07–68–C–0155.

—**Southwest Truck Body Co.**, St. Louis, Mo. $2,497,182. Semi-trailer mounted repair shop equipment. West Plains, Mo. Mobility Equipment Command, St. Louis, Mo. DA–AK L–68–C–2287.

—**Great Lakes Dredging & Dock Co.**, Baltimore, Md. $7,451,185. Dredging work on the Chesapeake and Delaware River Canal Project. New Castle County, Del. and Cecil County, Md. Engineer Dist., Philadelphia, Pa. DA–CW61–68–C–0193.

—**Bowen-McLaughlin-York Co.**, York, Pa. $4,625,000. Retrotfit of M48A1 tanks to M48A3 tank configuration. Army Weapons Command, Rock Island, Ill. DA–AF03–67–C–0076.

—**San Ore Gardner**, Houston, Tex. $5,787,-200. Construction of concrete gravity type dam and appurtenant works at the West Point Reservoir Project. Chambers County, Ala. and Troup County, Ga. Engineer Dist., Savannah, Ga. DA–CW–21–68–C–0050.

10—**Chamberlain Mfg. Corp.**, Elmhurst, Ill. $4,828,608. 155mm high explosive projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–67–C–0365.

—**Grosshans & Petersen, Inc.**, Marysville, Kan. $1,056,817. Construction work on the Webbers Falls Lock & Dam Project. Engineer Dist., Tulsa, Okla.

—**Guy F. Atkinson Co.**, San Francisco, Calif. $1,133,948. Repair of lock walls at the Lower Monumental Lock and Dam Project, Snake River, Wash. Engineer Dist., Seattle, Wash. DA–CW–67–68–C–0059.

—**Amron Corp.**, Waukesha, Wis. $1,594,618. Metal parts for 40mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0233.

—**Carter Carburetor**, Olivette, Mo. $1,779,-456. Metal parts for fuzes for 81mm explosive cartridges. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0291.

11—**Kanarr Corp.**, Kingston, Pa. $2,115,021. 40mm grenade launchers (M79). Army Weapons Command, Rock Island, Ill. DA–11–199–AMC–00715 (W).

—**Potashnick Construction, Inc.**, Fort Lauderdale, Fla. $1,999,490. Excavation work at the Four Rivers Basin Flood Control Project. Hillsborough County, Fla. Engineer Dist., Jacksonville, Fla. DA–CW17–68–C–0068.

—**Northrop-Carolina, Inc.**, Asheville, N.C. $1,280,836. Parachute ground flares. Aberdeen Proving Ground, Md. DA–AD05–68–C–0369.

12—**American Machine & Foundry Co.**, Brooklyn, N.Y. $6,811,119. Metal parts for 750-lb. bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA–09–68–C–161.

—**Emerson Electric**, St. Louis, Mo. $4,715,-863. Line item repair parts for the XM-28 armament sub-system. Army Weapons Command, Rock Island, Ill.

—**Bell Helicopter**, Fort Worth, Tex. $5,500,-000. AH-1G Cobra helicopters. Hurst, Tex. DA–AJ01–67–C–0469; $19,497,888. UH-1H Huey helicopters. Hurst, Tex. DA–AJ01–68–C–0566. Aviation Materiel Command, St. Louis, Mo.

—**Boeing Co.**, Morton, Pa. $9,000,000. CH-47C Chinook helicopters. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–68–C–1784.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $2,819,600. Supplies and services for production of OV-1D Mohawk aircraft and related items. Stuart, Fla. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–68–C–0190.

15—**Baldwin-Lima-Hamilton Corp.**, Philadelphia. $6,466,541. Design, manufacture, delivery and test of six hydraulic pump turbines for the Kaysinger Bluff Reservoir Project. Eddystone, Pa. Engineer Dist., Kansas City, Mo. DA–CW–41–68–C–0131.

—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $1,316,700. Metal parts for warheads for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0090.

—**Bogue Electric Mfg. Co.**, Paterson, N.J. $1,169,642. 1,081 three-kilowatt generator sets. Mobility Equipment Command. St. Louis, Mo. DA–AK01–68–C–7001.

16—**Harnischfeger Corp.**, Milwaukee, Wis. $4,-259,276. 20-ton truck-mounted cranes. Escanaba, Mich. Mobility Equipment Command, St. Louis, Mo. DA–AK01–68–C–B990.

—**Raytheon Corp.**, Andover, Mass. $1,800,-000. Production of Hawk industrial prototype hardware. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–0703.

17—**Granit Construction Co.**, Watsonville, Calif. $1,344,600. Work on the flood protection project at Klamath, Calif. Engineer Dist., San Francisco, Calif. DA–CW07–68–C–0046.

—**Hercules Engines, Inc.** $2,551,750. Multifuel engine assemblies for five-ton trucks. Tank Automotive Command, Warren, Mich. DA–AE–07–68–C–2234.

—**Hansel Phelps Construction Co.**, Greeley, Colo. $1,921,705. Work on the Trinidad Dam and Reservoir Project in Las Animas County, Colo. Engineer Dist., Albuquerque, N.M. DA–CW01–68–C–0088.

—**Pace Corp.**, Memphis, Tenn. $1,197,461. M123A1 and M112A1 cartridges. Camden, Ark. Picatinny Arsenal, Dover, N.J. DA–AA21–68–C–0863.

—**Dravo Corp.**, Pittsburgh, Pa. $16,182,490. Construction of a lock and dam at the Jones Bluff and Dam Project. Autanga and Lowendes County, Ala. Engineer Dist., Mobile, Ala. DA–CW01–68–C–0088.

—**Cosmodyne Corp.**, Torrance, Calif. $1,-898,323. Alterations to the Climatic Test Facility at Eglin AFB, Fla. Engineer Dist., Mobile, Ala. DA–CA01–68–C–0036.

—**Massman Construction Co.**, Kansas City, Mo. $3,745,597. Work on lock and dam number four, Arkansas River Project. Jefferson County, Ark. Engineer Dist., Little Rock, Ark. DA–CW03–68–C–0073.

—**Boeing Co.**, Morton, Pa. $6,161,700. Line items of spare parts for support of CH47 (Chinook) helicopters. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–68–A–0005.

18—**Standard Products Co.**, Cleveland, Ohio. $1,983,208. T135 track-shoe assemblies for M114 vehicles. Port Clinton, Ohio. Tank Automotive Command, Warren, Mich. DA–AE–07–68–C–1405.

—**General Motors**, Detroit, Mich. $1,005,540. 6V53 diesel engines for M113 vebicles. Tank Automotive Command, Warren, Mich. DA–AE–07–68–C–0410.

—**Pace Corp.**, Memphis, Tenn. $5,799,304. Illuminating signals. Picatinny Arsenal, Dover, N.J. DA–AA–21–68–C–0054.

—**Bauer Dredging Co.**, Port Lavaca, Tex. $1,003,270. Rental of a cutterhead dredge for use on the Mississippi River tributaries channel improvement project. Engineer Dist., Vicksburg, Miss. DA–CW–38–68–C–0113.

—**Gibbons & Reed Co.**, Portland, Ore. $1,-641,183. Work on the Lower Monumental Lock and Dam Project on the Snake River. Kahlotus, Wash. Engineer Dist., Seattle, Wash. DA–CW–67–68–C–0060.

19—**Bulova Watch Co.**, Providence, R.I. $1,-609,789. Head assemblies for 60mm mortar fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA–09–68–C–0077.

—**Remington Arms Co.** $7,673,805. Production of small arms ammunition and maintenance of the Lake City Army Ammunition Plant, Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–49–010–AMC–00003 (A).

—**Harvey Aluminum Sales**, Torrance, Calif. $11,631,054. Loading, assembling of ammunition and components and for maintenance and support services at the Milan, Tenn., Ammunition Plant. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–00520 (A).

—**Thiokol Chemical Corp.**, Bristol, Pa. $13,-711,831. Operation of the Longhorn Ammunition Plant, Marshall, Tex., and for loading assembling and packing of mortars, rocket motors, igniters and miscellaneous items. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–00200 (A).

—**I.D. Precision Components Corp.**, Jamaica, N.Y. $2,250,000. Metal parts for M557 fuzes. Gadsden, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0235.

—**UMC Industries**, Phoenix, Ariz. $1,430,-100. Loading and assembling 81mm illuminating projectiles. Goodyear, Ariz. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0050.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $4,227,482. 81mm illuminating projectiles. Marion, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0051.

—**Amron Corp.**, Orlando, Fla. $1,267,255. Metal parts for fuzes for 40mm high explosives. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0117.

—**Pace Corp.**, Memphis, Tenn. $1,355,078. Surface flares. Camden, Ark. Picatinny Arsenal, Dover, N.J. DA–AA–21–68–C–0497.

—**Harrington & Richardson Co.**, Worcester, Mass. $15,000,000. 5.56mm, M16A1 rifles, inspection, test equipment and facilities. Army Weapons Command, Rock Island, Ill. DA–AF–03–C–0045.

—**General Motors**, Ypsilanti, Mich. $19,000,-000. 5.56mm, M16A1 rifles, inspection, test equipment and facilities. Army Weapons Command, Rock Island, Ill. DA–AF03–68–C–0048.

22—**ITT Gilfillan, Inc.**, Los Angeles, Calif. $1,491,676. Advanced production engineering program for AN/TPQ-28 ground radar sets. Electronics Command, Fort Monmouth, N.J. DA–AB07–68–C–0182.

—**Philco-Ford Corp.**, Newport Beach, Calif. $2,406,274. Power supply units for Chaparral missiles. Procurement Agency, Pasadena, Calif. DA–AG07–67–A–0007.

—**Hol-Gar Mfg. Corp.**, Primos, Pa. $6,302,-286. 30-KW, diesel engine driven, generator sets. Mobility Equipment Command, St. Louis, Mo. DA–AK01–67–C–1425.

—**AVCO Corp.**, Stratford, Conn. $1,024,380. Turbine nozzles for T-53 engines for UH-1 helicopters. Aviation Materiel Command, St. Louis, Mo. F–41608–67–A–3234.

—**DeMaure Construction Co.**, Carson City, Nev. $1,156,640. Construction of an aircraft maintenance hanger. Marine Corps Air Facility, Futema, Okinawa. Engineer Dist., Okinawa.

23—**Lawless & Alford Co.**, Austin, Tex. $1,-683,072. Construction of two tactical equipment shops and facilities at Fort Hood, Tex. Engineer Dist., Fort Worth, Tex. DA–CA–63–68–C–0090.

—**Honeywell, Inc.**, Hopkins, Minn. $1,643,-220. Metal parts for fuzes for 40mm cartridges. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0099.

—**National Presto Industries**, Eau Claire, Wis. $7,076,000. Metal parts for 105mm high explosive projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0065.

—**Goodyear Tire & Rubber Co.**, Akron, Ohio. $1,241,980. Rubber tracked shoe assemblies for M48 tanks. St. Mary's, Ohio. Tank Automotive Command, Warren, Mich. DA–AE–07–68–C–1216.

—**Ward Industries**, Conway, Ark. $1,438,-645. Ambulance conversion/passenger buses. Austin, Tex. Tank Automotive Command, Warren, Mich.

—**General Motors**, Cleveland, Ohio. $20,101,-615. Motor buses. St. Louis, Mo. and Kosciusko, Miss. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–1989.

—**Chrysler Motors**, Detroit, Mich. $1,315,-567. Motor buses. Warren, Mich. and Lima, Ohio. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–1990.

—**International Harvester Co.**, Chicago, Ill. $1,753,366. Motor buses and ambulance conversion/passenger buses. Springfield, Ohio; Fort Wayne, Ohio; Conway, Ark.; Richmond, Ind.; Lima, Ohio and Kosciusko, Miss. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–1991.

24—**Continental Motors**, Muskegon, Mich. $5,-121,466. Engine assemblies for M48 tanks. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–0407.

—**Standard Products**, Cleveland, Ohio. $4,-906,632. Track shoe assemblies for personnel carriers. Port Clinton, Ohio. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–2259.

—**Brown & Root, Inc.**, Houston, Tex. $2,-490,827. Construction on the Sabine-Neches Waterway Project. Port Arthur, Tex. Engineer Dist., Galveston, Tex. DA–CW–64–68–C–0107.

—**General Motors**, Cleveland, Ohio. $20,101,-662. 155mm self-propelled howitzers. Army Weapons Command, Rock Island, Ill. DA–11–199–AMC–610 (W).

—**Ford Motors**, Dearborn, Mich. $1,366,206. 884 four-door sedans. Tank Automotive Command, Warren, Mich. DA–AE–07–68–C–2173.

—**Levinson Steel Co.**, Pittsburgh, Pa. $7,-400,918. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA–09–68–C–0098.

—**Ordnance Products**, Northeast, Md. $1,-495,533. Fuze assemblies for hand gre-

nades. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–902 (A).

25—**Honeywell, Inc.**, Hopkins, Minn. $2,043,361. Metal parts for fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0114.

26—**Parsons Mfg. & Stamping Co.**, Cordova, Tenn. $1,166,943. Rotating disks for 4.2-inch cartridges. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0015.

—**Bulova Watch Co.**, Valley Stream, N.Y. $4,098,360. 81mm projectile fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0283.

—**Hayes-Albion Corp.**, Albion, Mich. $2,040,430. 81mm projectiles. Hillsdale, Mich. and Richmond, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0036.

—**Chamberlain Mfg. Corp.**, New Bedford, Mass. $2,631,250. 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0286.

—**Kennedy Van Saun Corp.**, Danville, Pa. $1,291,500. Metal parts for 4.2-inch mortar projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0180.

—**American Machine & Foundary Co.**, York, Pa. $1,296,000. Metal parts for 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–67–C–0036.

—**Kisco Co.**, St. Louis, Mo. $2,032,000. Metal parts for 105mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0108.

—**Eby Construction Co.**, Wichita, Kan. $2,813,878. Construction and appurtenant work on the Gillham Dam and Reservoir Project. Howard and Polk Counties, Ark. Engineer Dist., Tulsa, Okla. DA–CW–56–68–C–0183.

—**TRW, Cleveland, Ohio.** $2,067,000. Bolt and roller assemblies for M14 rifles. Army Arsenal, Rock Island, Ill. DA–AF01–68–C–0608.

—**Standard Container Co.**, Montclair, N.J. $2,011,500. Ammunition box assemblies. Frankford Arsenal, Philadelphia, Pa. DA–AA25–68–C–0058.

—**Federal Laboratories**, Saltsburg, Pa. $1,042,500. Hand grenades. Edgewood Arsenal, Edgewood, Md. DA–AA15–68–C–0549.

—**LTV Electrosystems**, Huntington, Ind. $1,761,210. Radio sets. Electronics Command, Philadelphia, Pa. DA–AB05–68–C–0005.

—**Electro Mechanical Corp.**, Sayre, Pa. $1,057,549. Electrical equipment shelters. Electronics Command, Philadelphia, Pa. DA–AB05–67–C–2509.

—**General Electric**, Burlington, Vt. $1,103,700. Automatic aircraft guns and armaments parts. Army Procurement Agency, New York, N.Y. DA–AF03–68–C–0019.

—**Continental Motors**, Muskegon, Mich. $8,724,800. Multi-fuel engine assemblies for FY 1968 five-ton truck program. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–2315.

—**Mid-South Pavers, Inc.**, Nashville, Tenn. $1,282,098. Construction of a runway with access road, including airfield lighting system and operations building at Arnold Engineering Development Center, Manchester, Tenn. Engineer Dist., Mobile, Ala.

—**Continental Motors**, Mobile, Ala. $2,780,000. Work on Government furnished engine assemblies for M48, M60 and M130 combat vehicles. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–1166.

—**Raytheon Co.**, Andover, Mass. $2,820,774. Maintenance and modification of special tooling and test equipment for the Hawk missile system. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–0702.

—**Baltimore Contractors, Inc.**, Baltimore, Md. $5,247,940. Construction of an addition to the Pathology Building at Walter Reed Army Medical Center, Washington, D.C. Engineer Dist., Baltimore, Md. DA–CA–31–68–C–0070.

29—**Uniroyal, Inc.**, New York, N.Y. $4,850,147. Operation of the Army Ammunition Plant, Joliet, Ill., and for loading assembling and packing of ammunition. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–00062 (A).

—**Sperry Rand**, New York, N.Y. $11,646,888. Metal parts for medium caliber artillery projectiles, and for loading, assembling and packing of medium caliber ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–00080 (A).

—**Olin Mathieson Chemical Corp.**, New York, N.Y. $13,721,396. Operation and maintenance of the Army Ammunition Plant, Charleston, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–00097 (A).

—**A. O. Smith Corp.**, Chicago, Ill. $5,049,450. Metal parts for 750-lb. bombs. Bellmeade, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0078.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $4,141,080. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0030.

—**General Time Corp.**, Stamford, Conn. $4,416,000. Time fuzes. Peru, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0223.

—**E. I. du Pont Co.**, Wilmington, Del. $12,000,000. Design and procurement of equipment and supplies, and installment of five line plants for production of TNT. Newport, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0414.

—**Donovan Construction Co.**, New Brighton, Minn. $4,380,000. Metal parts for 155mm high explosive projectiles. Minneapolis, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–67–C–0044.

—**Penner Construction Co.**, Denver, Colo. $3,855,729. Construction of six tactical equipment shops and facilities at Fort Riley, Kan. Engineer Dist., Kansas City, Mo. DA–CA41–68–C–0033.

—**Sperry Rand**, Phoenix, Ariz. $1,544,138. Gyro magnetic compass sets and directional gyros. Army Procurement Agency, Pasadena, Calif. DA–AG07–68–C–1187.

—**General Motors**, Detroit, Mich. $1,453,159. Diesel engines for M551 vehicles. Tank Automotive Command, Warren, Mich. DA–AE07–68–C–0542.

—**Jahncke Service, Inc.**, New Orleans, La. $1,383,840. Rental of a dredge. Engineer Dist., Memphis, Tenn. DA–CW66–68–L–0098.

—**Jelco, Inc.**, Salt Lake City, Utah. $2,599,783. Power house installation on the Little Goose Lock and Dam Project. Columbia and Whitman Counties, Wash. Engineer Dist., Walla Walla, Wash. DA–CW68–C–0080.

—**Stewart-Erickson**, Seattle, Wash. $4,207,389. Grading and excavation work on the Little Goose Lock and Dam Project. Whitman County, Wash. Engineer Dist., Walla Walla, Wash. DA–CW68–C–0086.

—**Sante-Fe Engineers, Inc., and Matich Bros.**, Lancaster, Calif. $2,041,645. Construction of an aircraft test complex at Edwards AFB, Calif. DA–CA09–68–C–0104.

30—**Batesville Mfg. Co.**, Batesville, Ark. $2,395,800. Bomb fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0053.

—**Action Mfg. Co.**, Philadelphia, Pa. $1,500,000. Metal parts for bomb fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–AA09–68–C–0085.

—**Standard Container Co.**, Montclair, N.J. $1,522,503. Packing boxes for ammunition. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa. DA–AA25–68–C–0596.

—**Allis Chalmers Mfg. Co.**, Milwaukee, Wis. $2,200,863. Scoop loaders. Deerfield, Ill. Mobility Equipment Command, St. Louis, Mo. DA–AK01–67–C–1411.

—**General Dynamics**, Pomona, Calif. $1,051,598. Engineering services for the Redeye missile system. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–0374.

—**Sanders Associates**, Bedford, Mass. $1,562,593. Advanced production engineering for the Forward Area Alert Radar. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–1930.

—**Hercules, Inc.**, Wilmington, Del. $8,653,845. Operation of the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill. W–11–173–AMC–0037 (A).

—**Philco-Ford Corp.**, Philadelphia, Pa. $5,000,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—**Boeing Co.**, Morton, Pa. $7,674,240. Spare parts for CH–47 helicopters. Aviation Materiel Command, St. Louis, Mo. DA–AJ–01–68–A–0005.

—**Hughes Aircraft**, Fullerton, Calif. $2,258,409. Radio sets and components. Army Procurement Agency, Pasadena, Calif. DA–AB05–68–C–0008.

—**Hughes Aircraft**, Fullerton, Calif. $3,110,922. Semi-automatic flight operations center, ancillary items and reports. Electronics Command, Fort Monmouth, N.J. DA–AB07–68–C–0354.

—**Hughes Tool Co.**, Culver City, Calif. $7,472,000. Light observation helicopters. Aviation Materiel Command, St. Louis, Mo. DA–AJ01–68–C–1789.

—**Collins Radio Co.**, Dallas, Tex. $1,179,383. Ten radio terminal sets. Electronics Command, Philadelphia, Pa. DA–AB05–08–C–0020.

—**Holton Tractor Co.**, Portland, Ore. $1,061,386. Maintenance and overhaul of 93 tractors. Mobility Equipment Command, St. Louis, Mo. DA–AK01–68–C–7184.

—**Raytheon Co.**, Andover, Mass. $9,197,772. Hawk industrial prototype hardware. Army Missile Command, Huntsville, Ala. DA–AH01–68–C–0703.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $3,684,480. Propellant for 7.62mm ball ammunition and 20mm ammunition. Frankford Arsenal, Philadelphia, Pa. DA–AA25–68–C–0617.

—**Aerojet General**, Azusa, Calif. $2,272,750. Seven forward looking infrared target acquisition fire control systems. Frankford Arsenal, Philadelphia, Pa. DA–AA25–67–C–0471.

—**Security Signals, Inc.**, Cordova, Tenn. $1,402,878. Igniter time blasting fuzes. Army Procurement Agency, Cincinnati, Ohio.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $1,112,084. 1¼-ton trucks. General Purpose Vehicle Agency, Warren, Mich. DA–20–113–AMC–10235 (T) MYP.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,000,000. Reactivation of a plant for production of large caliber ammunition items. Ravena, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill. DA–11–173–AMC–65 (A).

DEPARTMENT OF THE NAVY

1—**General Electric**, West Lynn, Mass. $9,875,000. Engineering development of the TF-34 turbo-fan engine for VSX aircraft. Naval Air Systems Command. N00019–68–C–0443.

—**LTV Aerospace Corp.**, Dallas, Tex. $3,060,000. Prototype test program for A-7E aircraft. Naval Air Systems Command. N00019–68–C–0075.

2—**United Aircraft**, Stratford, Conn. $3,324,223. UH-34D aircraft. Naval Air Systems Command. N00019–68–C–0335.

—**Honeywell, Inc.**, Seattle, Wash. $1,285,026. MK 48 MOD 0 torpedo program management, test planning, data taking, data reduction, data analysis, full time vessel service and supporting services. Naval Ordnance Systems Command. N00017–68–C–1213 A8–0552–520.

3—**Louis Allis Co.**, Greendale, Wis. $3,147,053. Power supply units for sonar equipment. Naval Ship Systems Command. N00024–68–C–5329.

—**Industrial Engineering Co.**, Baltimore, Md. $1,587,890. Addition to the laboratory and technical support building at the National Naval Medical Center, Bethesda, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.

—**Western Electric**, New York, N.Y. $8,100,000. Oceanographic research. Burlington, N.C. Naval Electronic Systems Command. N00039–68–C–3601.

4—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $23,757,671. MK 82, MOD 2 500-lb. bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–0745.

—**PRD Electronics,** Westbury, N.Y. $8,746,-308. VAST building blocks and data transfer unit. Naval Air Systems Command. N00019–68–C–0449.

—**Sanders Associates,** Nashua, N.H. $5,-377,500. Work on classified electronic equipment. Naval Air Systems Command. N00019–68–C–0470.

—**LTV Aerospace Corp.,** Dallas, Tex. $3,-109,199. Increase in the limitation of authorization for FY 1968 A-7E aircraft. Naval Air Systems Command. N00019–67–C–0082.

—**Radiation, Inc.,** Melbourne, Fla. $2,086,-296. Digital data communication sets. Naval Air Systems Command. NOw–66–0325.

5—**Dynell Electronics,** Plainview, N.Y. $1,-244,274. Production of alteration sets for range and beacon trackers for Fire Control System Radar. Naval Ordnance Systems Command. N00017–68–2313.

—**U.S. Steel,** Pittsburgh, Pa. $1,905,880. MK 82, MOD. 2 Bomb bodies. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–68–C–3599.

9—**Honeywell, Inc.,** Minneapolis, Minn. $6,-895,300. Rockeye II components. Naval Air Systems Command. N000019–68–C–0315.

—**Republic Electronic Industries,** Huntington, N.Y. $4,683,760. Tactical air navigation sets. Aviation Supply Office, Philadelphia, Pa. N00383–68–C–3338.

—**United Aircraft,** East Hartford, Conn. $1,801,856. Spare parts for J-52 engines for A4E and A-6A aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–8–6900–AS218.

—**Consolidated Diesel Electric Co.,** Old Greenwich, Conn. $1,216,220. Aircraft spotting dollies. Naval Air Systems Command. N00019–68–C–0394.

—**Harvey Aluminum Co.,** Torrance, Calif. $1,267,200. Weteye bombs. Naval Air Systems Command. N00019–68–C–0325.

—**General Time Corp.,** Skokie, Ill. $1,177,-056. Mechanical time fuzes. Naval Air Systems Command. N00019–68–C–0314.

10—**Grumman Aircraft,** Bethpage, N.Y. $9,-586,632. A-6A aircraft. Naval Air Systems Command. N00019–67–C–0185.

—**Newport News Shipbuilding & Dry Dock Co.,** Newport News, Va. $5,000,000. Overhaul, alteration and C-3 Poseidon missile conversion of the fleet ballistic missile nuclear powered submarine USS Daniel Boone (SSBN-629). Naval Ship Systems Command. N00024–68–C–0260.

—**Lockheed Aircraft,** Burbank, Calif. $4,-620,000. Configuration changes to P-3B aircraft. Naval Air Systems Command. N00019–68–C–0043.

—**Royal Industries,** Santa Ana, Calif. $1,-592,649. External auxiliary 600-gallon fuel tanks. Alhambra, Calif. Naval Air Systems Command. N00019–67–C–0649.

—**Kollsman Instrument Corp.,** Elmhurst, N.Y. $1,205,400. Altimeter encoders. Naval Air Systems Command. N00019–68–C–0409.

11—**LTV Aerospace Corp.,** Dallas, Tex. $54,-250,023. FY 1968 procurement of A-7D aircraft. Naval Air Systems Command. N00019–67–C–0143.

—**Lockheed Aircraft,** Burbank, Calif. $53,-670,000. P-3C aircraft. Naval Air Systems Command. N00019–68–C–0073.

—**Norris Industries,** Los Angeles, Calif. $22,335,834. MK 82 MOD 1 500-lb. bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–67–C–2685.

—**General Signal Corp.,** Woodbury, N.Y. $1,350,000. Scan/radar data converters. Naval Air Systems Command. N00019–68–C–0288.

—**Trader Construction Co.,** Havelock, N.C. $1,254,600. Construction of barracks at Camp LeJeune. N.C. Atlantic Div., Naval Facilities Engineering Command. NBy–88029.

12—**Aerojet General,** Azusa, Calif. $4,172,893. Development of four swimmer delivery vehicles, two two-man vehicles and two six-man vehicles, with data and support. Naval Training Device Center, Orlando, Fla. N61339–68–C–0194.

—**Cardwell Mfg. Co.,** Wichita, Kan. $1,205,-886. MK 7 MOD 3 arresting engine assemblies and spares. Naval Air Engineering Center, Philadelphia, Pa. N00156–68–C–1618.

15—**Sanders Associates,** Nashua, N.H. $10,-000,000. Electronic equipment. Naval Air Systems Command. NOw (A) 66–0356.

—**Grumman Aircraft Engineering Corp.,** Bethpage, N.Y. $3,800,000. Long lead time effort and material to support planned FY 1969 procurement of A-6A aircraft. Naval Air Systems Command. NOw–66–0058.

—**General Dynamics,** Pomona, Calif. $2,-634,000. Increased funding for Standard Arm missiles. Naval Air Systems Command. N00019–67–C–0399.

—**Sperry Rand,** Bristol, Tenn. $1,467,566. Shrike missile guidance and control sections and sets of wings and fins. Naval Air Systems Command. N00019–68–C–0070.

—**E. E. Black, Ltd.,** Honolulu, Hawaii. $1,-169,500. Installation of enlisted men's barracks at the Submarine Base, Pearl Harbor, Hawaii. Pacific Div., Naval Facilities Engineering Command, Honolulu, Hawaii. NBy–91001.

—**Interstate Electronics,** Anaheim, Calif. $1,000,000. Poseidon missile test instrumentation portable data processing sets. Special Projects Office. N00030–68–C–0230.

—**Sperry Gyroscope,** Great Neck, N.Y. $1,-087,000. Increase in the limitation of authorization for Terrier MK 76 MOD 3 and MOD 5 fire control system modernization. Naval Ordnance Systems Command. N00017–67–C–0045.

16—**Magnavox Co.,** Fort Wayne, Ind. $16,446,-747 (total value of two contracts). Airborne anti-submarine warfare systems. Naval Air Systems Command. N00019–68–C–0497 and N00019–68–C–0498.

—**Zachry Co.,** San Antonio, Tex. $4,913,000. Construction of an outlying field at the Naval Auxiliary Air Station, Beeville, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La.

—**Alsco, Inc.,** St. Louis, Mo. $4,122,227. Rocket launchers. Naval Air Systems Command. N00019–67–C–0621.

—**General Dynamics,** Groton, Conn. $3,000,-000. Overhaul, refueling and conversion of the nuclear powered ballistic missile submarine USS Von Steuben (SSBN-632). Naval Ship Systems Command. N00024–68–C–0320.

—**Dynalectron Corp.,** Washington, D.C. $2,-412,343. Data reduction service of photo-optical data for the Fleet Missile Systems Analysis and Evaluation Group. Norlo, Calif. Navy Purchasing Office, Los Angeles, Calif. N000123–68–C–1303.

—**Martin-Marietta,** Baltimore, Md. $1,567,-154. Design, development and fabrication of pod launchers, warheads, alignment equipment, gages and measuring equipment for the HART/ZAP weapon. Naval Ordnance Laboratory, White Oaks, Md. N60931–68–C–0277.

—**Cosmodyne Corp.,** Torrance, Calif. $1,-371,261. Three oxygen-nitrogen plants and related data. Naval Ship Systems Command. N00024–68–C–5305.

—**Raytheon,** Waltham, Mass. $1,126,800. Traveling wave electron tubes. Navy Electronics Supply Office, Great Lakes, Ill. N00126–68–C–6131.

—**Litton Systems,** Silver Spring, Md. $1,-190,509. Electronic countermeasure equipment. College Park, Md. Naval Air Systems Command. NOw–66–0603.

—**Microwave Associates,** Sunnyvale, Calif. $1,068,000. Traveling wave electron tubes. Navy Electronics Supply Office, Great Lakes, Ill. N00126–68–C–6124.

—**Microwave Electronics,** Palo Alto, Calif. $1,031,700. Traveling wave electron tubes. Navy Electronics Supply Office, Great Lakes, Ill. N00126–68–C–6132.

17—**Akwa-Downey Construction Co.,** Milwaukee, Wis. $2,222,000. Construction of a training building at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C. NBy–840087.

18—**Bell Aerosystems Co.,** Buffalo, N.Y. $2,-400,000. Modification kits for the All Weather Carrier Landing System. Naval Ship Systems Command. N00024–68–C–1229.

—**Sperry Rand Corp.,** St. Paul, Minn. $2,-193,443. Manufacture of AN/TYQ-20 Marine Tactical Data Systems. Naval Electronic Systems Command. N00038–C–3568.

—**Clevite Corp.,** Cleveland, Obio. $1,465,725. Research and development of the comb filter techniques of MK 48 torpedoes. Naval Ordnance Systems Command. N00017–67–C–1206, Mod. P005–A8–0541–482.

19—**General Dynamics,** Pomona, Calif. $7,-720,000. Production of medium range Standard Missiles. Naval Ordnance Systems Command. N00017–67–C–0047 MOD P010.

22—**Honeywell, Inc.,** St. Petersburg, Fla. $3,-344,595. Poseidon missiles. Special Projects Office. N00030–68–C–0247.

—**Lott, Inc.,** Houston, Tex. $2,349,000. Construction of an aircraft maintenance hanger at the Naval Auxiliary Air Station, Kingsville, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La. NBy–90395.

—**United Aircraft,** East Hartford, Conn. $1,969,217. Increased funding for J52-P-8A engines. Naval Air Systems Command. N00019–67–C–0182.

—**Interstate Electronics,** Anaheim, Calif. $1,-750,000. Digital test instrumentation sets for Poseidon missiles. Special Project Office. N00030–68–C–0253.

—**Ott-Atwater, Inc.,** Seattle, Wash. $1,588,-000. Construction of a station hospital and dental clinic at Naval Air Station, Whidbey Island, Wash. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash. NBy–77270.

—**Lockheed Missiles & Space Co.,** Sunnyvale, Calif. $1,480,397. Technical support for the Polaris missile. Special Projects Office. N00030–68–C–0229.

23—**General Dynamics,** Pomona, Calif. $4,190,-000. Additional research and development on the Standard Arm missile. Naval Air Systems Command. N00019–68–C–0400.

—**General Electric,** Binghampton, N.Y. $1,-392,392. Autopilots. Naval Air Systems Command. N00019–68–C–0306.

24—**General Electric,** Schenectady, N.Y. $8,-970,000. Design and furnishing of nuclear propulsion components. Naval Ship Systems Command. N00024–67–C–5014.

—**Sylvania Electric Products,** Mountain View Calif. $8,819,943. Electronic countermeasure systems for EA-3B aircraft. Naval Air Systems Command. N00019–68–C–0499.

—**Woods Hole Oceanographic Institution,** Woods Hole, Mass. $2,394,000. Oceanographic studies. Office of Naval Research.

—**United Aircraft,** Stratford, Conn. $2,178,-000. Airframe parts for CH-53A helicopters. Aviation Supply Office, Philadelphia, Pa. N00383–8–91015A–AB411.

25—**United Aircraft,** East Hartford, Conn. $3,748,489. Ground support equipment for the TF30 engine. Aviation Supply Office, Philadelphia, Pa. N00383–8–69000A–AF281.

—**Pathman Construction Co.,** Highland Park, Ill. $2,375,000. Construction of a warehouse, technical training building, barracks and modification of existing buildings at the Naval Air Facility, Detroit, Mich. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill. NBy–74388, NBy–79014.

—**Burnett Construction Co.,** Corpus Christi, Tex. $2,233,200. Construction of an aircraft maintenance hanger at the Naval Auxiliary Air Station, Beeville, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La. NBy–90396.

—**Greenhut Construction Co.,** Pensacola, Fla. $1,664,989. Construction of an aircraft weapons system training facility at Keesler AFB, Miss. Gulf Div., Naval Facilities Engineering Command, New Orleans, La. NBy–86303.

—**Ries Construction Co.,** San Diego, Calif. $1,462,444. Construction of bachelor officers' quarters at the Naval Ampbibious Base, Coronado, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. NBy–85207.

—**United Aircraft,** East Hartford, Conn. $1,475,420. Test, analysis and evaluation of modified TF30-P-3 engines. Naval Air Systems Command. N00019–68–C–0480.

26—**United Aircraft,** Stratford, Conn. $37,-800,000. CH-53A helicopters. Naval Air Systems Command. N00019–68–C–0471.

—**Grumman Aircraft Engineering Corp.,** Bethpage, N.Y. $19,000,000. Increase in the limitation of authorization for EA-6A aircraft. Naval Air Systems Command. N00019–68–C–0209.

—**Sippican, Inc.,** Marion, Mass. $2,375,747. Expendable bathythermograph probes, stripchart recorders and launchers. Naval Ship Systems Command. N00024–68–C–1105.

—**Litton Industries,** Woodland Hills, Calif. $1,713,112. ASQ-61 computer equipment. Aviation Supply Office, Philadelphia, Pa. N00383–68–A–1201–0039.

—**Sperry Rand Corp.,** St. Paul, Minn. $1,-109,872. Design, development and production of computer programs for anti-sub-

marine warfare data processing system. Naval Air Development Center, Johnsville, Pa. N62269-68-C-0569.

29—**Grafton Boat Co.**, Grafton, Ill. $1,697,795. Construction of 55 landing crafts. Naval Ship Systems Command. N00024-68-C-0323.

—**United Aircraft**, Hartford, Conn. $1,590,-236. Support assemblies for TF-30-P3 engines for the F-111A aircraft. Aviation Supply Office, Philadelphia, Pa. N00383-8-6900A-AF284.

30—**Stanford University**, Palo Alto, Calif. $6,-570,000. Research. Office of Naval Research.

—**Bethlehem Steel**, Baltimore, Md. $6,228,-000. Modernization of four ocean minesweepers. Naval Ship Systems Command. N62678-67-C-0004.

—**Norris Industries**, Vernon, Calif. $1,094,-456. Motor tubes for air-to-air missiles. Naval Ordnance Laboratory, Indian Head, Md. N00174-68-C-0521.

—**Tracor, Inc.**, Austin, Tex. $1,042,361. Chaff dispensers. Naval Air Systems Command. N00019-68-C-0279.

DEPARTMENT OF THE AIR FORCE

1—**General Electric**, Utica, N.Y. $2,000,000. Production of airborne countermeasure equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF 33657-68-C-1026.

2—**Bendix Corp.**, Teterboro, N.J. $3,640,250. Production of aircraft instruments. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF 33657-68-C-0844.

—**Oshkosh Truck Corp.**, Oshkosh, Wis. $2,-268,068. Production of aircraft towing tractors. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF F33657-68-C-0184.

—**Federal Electric Corp.**, Paramus, N.J. $2,-098,677. Engineer, furnish and install a communication control system and associated equipment at Vandenberg AFB, Calif. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. AF F34601-68-C-3195.

—**Litton Systems, Inc.**, Woodland Hills, Calif. $1,489,750. Repair of components of the inertial navigation system applicable to F-4 aircraft. Duluth, Minn. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. AF 04806-67-A-0478.

3—**Applied Technology, Inc.**, Palo Alto, Calif. $1,460,000. Production of radar receiving system ER-168 and associated equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-10001.

—**ITEK Corp.**, Lexington, Mass. $1,573,250. Development of a 48-inch telescope system. Air Force Eastern Test Range, Patrick AFB, Fla.

—**Western Electric**, New York, N.Y. $1,649,-500. Engineering services for the overseas automatic voice network. Waltham, Mass. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. AF 19628-68-C-0269.

4—**Litton Systems**, Woodland Hills, Calif. $1,450,677. Supplies and services for the installation of inertial guidance systems in VC-137 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F04606-67-A-0478.

—**International Harvester Co.**, San Diego, Calif. $2,827,613. Turbine driven electrical power plants and generator sets. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606-68-D-0643.

—**General Electric**, West Lynn, Mass. $2,-500,000. J-64 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-0713.

9—**Collins Radio Corp.**, Dallas, Tex. $5,672,-750. High-frequency, single side band radios. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. AF 68-C-0164.

—**Batesville Mfg. Co.**, Camden, Ark. $1,300,-000. Bomb dispensers and containers. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF 33657-68-C-1094.

—**Boeing Co.**, Seattle, Wash. $1,492,500. Minuteman missiles. Space & Missile Systems Organization (AFSC), Los Angeles, Calif. AF 04701-68-C-0165.

10—**Boeing Co.**, Wichita, Kan. $1,843, 528. Spare parts for B-52 aircraft. Oklahoma Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601-68-C-1902.

11—**Hallicrafters Co.**, Rolling Meadows, Ill. $2,050,000. Electronic countermeasure equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-1015.

12—**Hallicrafters Co.**, Rolling Meadows, Ill. $1,030,745. Production of electronic equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-0079.

15—**United Aircraft**, West Palm Beach, Fla. $2,942,500. Work on an advanced propulsion system control. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615-68-C-1207.

—**Litton Systems**, Woodland Hills, Calif. $1,391,373. Spare parts for F-111 navigational instruments. Duluth, Minn. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606-68-A-0147.

—**Boeing Co.**, Wichita, Kan. $1,353,125. Collection and analysis of data relative to the Low Altitude Clear Air Turbulence program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615-68-C-1468.

16—**Marwais Steel Co.**, Richmond, Calif. $2,-161,396. Steel arch aircraft shelters. 2750th Air Base Wing, Wright-Patterson AFB, Ohio. F33601-68-C-0849.

—**Republic Aviation**, Farmingdale, N.Y. $1,-211,000. Engineering services for F-105 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606-68-C-0300-0008.

—**M.I.T.**, Cambridge, Mass. $3,000,000. Research on advanced inertial sensor techniques. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615-68-C-1155.

17—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $1,111,680. Production of J-69 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-0891.

18—**Cubic Corp.**, San Diego, Calif. $4,145,215. Production of navigation equipment for RF-4C and B-57 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657-68-C-0911.

22—**McDonnell Douglas Corp.**, Tulsa, Okla. $2,641,763. Rehabilitation of Air Force Plant Number Three, Tulsa, Okla. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

23—**Thiokol Chemical Corp.**, Bristol, Pa. $4,-747,500. Production of Stage I Minuteman missile motors. Brigham City, Utah. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04-684-926.

24—**Aerojet General**, Downey, Calif. $5,799,-358. Production of anti-personnel munitions. Batesville, Ark. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF 33657-68-C-0922.

25—**General Electric**, Burlington, Vt. $1,290,-120. Aircraft armament. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga. AF 09603-68-C-1997.

—**C. H. Koch & Sons**, Corte Madera, Calif. $2,000,000. Survival kit containers for F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F-33657-68-C-1024.

—**Olin Mathieson Corp.**, New York, N.Y. $1,314,360. Operation of Air Force Plant Number 80 and for production of missile propellant. Saltville, Va. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608-68-D-0401.

30—**Applied Technology, Inc.**, Palo Alto, Calif. $1,875,900. Engineering and installation of 14 channel video tape recorders on F-105 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606-67-A-1818.

Army Munitions Command Continues RDT&E

(*Continued from Page 36*)

need, requires an exploratory development effort or task to bring about its solution.

The system of QMDO planning, a fairly recent development of the Department of the Army, is suffering from growing pains. It appears, however, to show considerable benefit as a management tool for determining the most promising technical directions, and also as a vehicle for improving technical communications.

Determining Technical Progress.

With well defined objectives and technical approaches, and detailed task descriptions of exploratory development work to be performed, the job of following the progress of technical accomplishment should not be an arduous one. The network structure, supported by narrative descriptions of planned effort, provides alternate avenues for overcoming technical voids. The estimate of success associated with each of the avenues makes it possible for a manager to suggest changes in direction when the present course of action appears fruitless.

Summary

The research and exploratory development programs of the U.S. Army Munitions Command provide the technological base and, consequently, are the backbone of the entire RDT&E munitions program. Continued emphasis on both policy and program planning of these efforts is required to support the development of effective, safe and reliable munitions systems.

Mid-management's role in long and short range planning is the careful development of policy and its implementation. To enhance productivity in research and exploratory development, such factors as the definition of threat, information needs relative to materiel/system deficiencies, and mission objectives must be considered.

The entire process of planning in research and exploratory development involves solutions to such problems as facility needs, research program balance, and determining means to indicate the most promising directions.

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Use of DD Form 250 Now Mandatory for Defense Contractors

The Defense Supply Agency has announced that DD Form 250, Material Inspection and Receiving Report, is now mandatory and must be used by all contractors making shipments to the Government.

A supply of the new forms, which came into use early in 1967, is now available to defense contractors at the Defense Contract Administration Services (DCAS) office indicated in each contract.

DD Form 250 is used to record the most important information of the procurement process. It contains such information as the identification of the contract, the buyer, the contractor and the government administrator. The form also contains the location of points of shipment, office of payment and the terms of discount and, finally, the certification of inspection and acceptance by the Government.

One of the most beneficial uses of the new form is that it can serve as a demand for payment when four copies are stamped "Invoice" and mailed to the payment office cited in the contract. This eliminates the need for contractors to prepare a special commercial invoice.

When the item or items are inspected and accepted at a defense contractor's plant, the contractor should immediately send for copies stamped "Invoice" to the cognizant Defense Contract Administration Services Region (DCASR). He can expect payment within 10 to 14 days.

The form is made up as a hectograph master sheet for reproduction. When the information is typed or written in the blocks, the master sheet is imprinted so that it can be used by the contractor for reproduction on an ordinary spirit-gelatin machine. A variation of the form comes with six carbon tissues attached to the hectograph master sheet to allow for immediate use of the six carbons.

Information on the use of DD Form 250 can be found in Defense Procurement Circular Number 59, dated Feb. 14, 1968, which is available to contractors from Defense Contract Administration Services offices.

DSA Updates Engineer Drawing Repository Directory

The Defense Supply Agency has issued an updated version of its Directory of DOD Engineering Drawing Repositories, TD–1, incorporating information changes and additions which have occurred since the first issue in 1964.

TD–1 provides the names and addresses of DOD data repository sites; information regarding availability, limitations and requisitioning procedures; and, generally, the categories of items for which drawings are maintained.

The directory is intended for use by DOD activities and other agencies of the Government as a reference guide to potential sources of engineering information required in support of assigned missions.

It may also be useful to defense contractors whenever the terms of their contracts of formal agreements with government procuring activities specifically authorize acquisition of such reposited data.

Copies of the directory may be obtained from the Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa. 19111.

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